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THE

CYCLOPÆDIA

OF

PRACTICAL MEDICINE.

VOL. III.

THE

CYCLOPÆDIA

OF

PRACTICAL MEDICINE:

COMPRISING

TREATISES ON THE NATURE AND TREATMENT OF DISEASES, MATERIA MEDICA AND THERAPEUTICS MEDICAL JURISPRUDENCE, ETC., ETC.

EDITED BY

JOHN FORBES, M.D. F.R.S.
PHYSICIAN TO THE QUEEN'S HOUSEHOLD, ETC.

ALEXANDER TWEEDIE, M.D. F.R.S.
PHYSICIAN TO THE LONDON FEVER HOSPITAL, AND TO THE FOUNDLING HOSPITAL, ETC.

JOHN CONOLLY, M.D.
LATE PROFESSOR OF MEDICINE IN THE LONDON UNIVERSITY, PHYSICIAN TO THE HANWELL LUNATIC ASYLUM, ETC.

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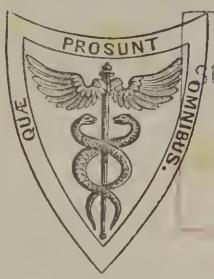
ROBLEY DUNGLISON, M.D.
PROFESSOR OF INSTITUTES OF MEDICINE IN JEFFERSON COLLEGE, PHILADELPHIA, LECTURER ON CLINICAL MEDICINE AT THE PHILADELPHIA HOSPITAL, ETC.

'Hæc demum sunt quæ non subgessit phantasiæ imaginatricis temeritas sed phænomena practica edocuere."—SYDENHAM.

IN FOUR VOLUMES.

VOL. III.

INFLUENZA—RAPE.



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THE

CYCLOPÆDIA

OF

PRACTICAL MEDICINE.

INFLUENZA. (*Epidemic Catarrh.*) The disease now commonly known by this name, first given to it by the Italians, was not particularly noticed by physicians before the sixteenth century. Since that period it has many times appeared in Europe and in other quarters of the globe. Influenza seems to bear the same relation to ordinary catarrh that epidemic cholera bears to the common or sporadic cholera that occurs every year. Of all epidemic diseases it is the most universal; and the rapidity of its march and extent of its range over land and sea, sometimes in both hemispheres and in different climates, in opposite seasons and in all varieties of weather, among people of all classes, naturally led to the supposition that some extraordinary *influence* could alone give rise to such a wide-spreading malady. The French call it *la grippe*, under which name Sauvages first described the epidemic catarrhal fever of the year 1743.

To collate the various accounts of any one visitation of this epidemic, such, for example, as that of 1775, or of 1782, or of 1803, in order to deduce some general principles respecting its mode of propagation, pathology, or treatment, would occupy a considerable treatise: it must, therefore, be an elaborate task to draw general conclusions from all the records we now possess of this singular disease, and to condense them in a space suitable for a work like the present. Limited by this circumstance, we shall take a brief survey, first, of the most remarkable dates of its appearance and progress in the last three centuries; secondly, its symptomatology; thirdly, its treatment; fourthly, facts and general inferences relative to the causes of it, such as phenomena of the weather and diseases among brutes: fifthly, its contagious property; and, sixthly, its influence on other diseases, and connection with diarrhœa, dysentery, and cholera.

1. We find no medical description of the epidemic catarrhal fever before the year 1510. "It was called *coccoluche*, because the sick wore a cap close over their heads." The symptoms of the disease, as it then occurred, nearly resembled those which it has assumed in later visitations, namely, severe pain over the eyes, sneezing, coryza, heaviness, difficulty of breathing, hoarseness, loss of strength and appetite, fever and harassing cough. Schenk says that physicians then looked upon it as a new disease. Its course seems to have been in a north-westerly direction, from Malta to Sicily, Spain, Italy, Germany, France, and Britain; and Short says that "it attacked *at once*, and raged over all Europe, not missing a family, and scarce a person, and that none died except some children. In some it went off with a looseness; in others by sweating. *Bleeding and purging did hurt.*" (Short's Chronol. Hist. of the Weather, &c. vol. i. p. 204; and Dict. des Scien. Méd. Art. *Grippe*, p. 351.)

In 1557, an epidemic of the same nature prevailed in different countries. Fonseca says that in this year it infested Asia, thence came to Constantinople, and having spread itself all over Europe, afterwards attacked America, its course being westerly. Mercatus asserts that "before the beginning of autumn 1557, it attacked all parts of Spain *at once*, so that the greatest part of the population in that kingdom were seized with it almost on the same day." (See Report, by Dr. Glass, in Lettsom's Memoir of Dr. Fothergill, 4to. p. 625.) Riverius has transmitted to us an account of this epidemic. Unlike that of 1510, it was fatal to many: in a small town near Madrid, Mantua Carpentaria, bleeding was said to be so fatal that two thousand patients died after it in September. (Short's Hist. vol. i. p. 223.) At Alkmaer, in Holland, two hundred died of it in October.

The catarrhal epidemic fever of 1580 was distinguished by its complication with malignant fever or plague, as related by Forestus and Sennertus. (Dict. *ut supra.*) The latter speaks of its ravages at the end of summer and the beginning of autumn all over Europe; in some parts of which, as in Paris, it was the *precursor* of the plague. (Webster's Hist. of Epidemics, vol. i. p. 263.) It was in Sicily in June, at Rome in July, in August at Venice and Constantinople, in September in Hungary and Germany, in October on all the Baltic coast, in November in Norway, in December in Denmark, Sweden, Poland, and Russia; its course being from E. and S. to W. and N. (Short's Hist. vol. i. p. 262.) Mercatus says that it raged also in Spain, and destroyed not a few. (*Dr. Glass*, ubi supra.) Grand Cairo lost a prodigious multitude the same year by the plague. It is a remarkable fact, and ought not to escape our notice, that France appears to have been the only country in Europe affected that year by the plague; and it appears also to have been the first to be visited by the epidemic catarrh, its precursor; so that Buldutius even dates its origin from France. (Short's Hist. i. 262.)

The influenza of 1658, of which Willis has left us an account, visited Europe and this kingdom *suddenly* in April, and after excessive heat

in August was followed by a fatal epidemic fever. (Short's Hist. vol. i. p. 331; and Webster's Hist. 310.)

Sydenham and Etmuller have described the epidemic catarrh of 1675, which began in Germany in September, and in England in October. Malta was afflicted by the plague the same year, from which it remained free till the last severe visitation of this scourge in 1813.

The epidemic catarrhal fever which raged during the autumn and winter of 1729, in the space of five months' time visiting almost every part of Europe, was very fatal in many large cities, such as Paris and London. Loew says that in the latter more persons died than at any one time since the plague of 1665, about one thousand being cut off weekly in September. In the beginning of winter it reached France. A few weeks after, it visited the upper part of Italy with great mortality. In February it afflicted Rome and the Rhine. Turin and Milan suffered extremely. It reached Naples in March, and after this disappeared.—(*Short*, ii. p. 54. *Hoffmann*, Opera, tom. ii. p. 109.)

The influenza of 1732–3 is described in the second volume of the Edinburgh Medical Essays, and by Huxham; and was so far remarkable that it affected the mucous membrane of the alimentary canal as well as that of the organs of respiration. It spread over all Europe, and appeared also in America. It was first noticed about the middle of November in different parts of Germany. Edinburgh appears to have been the first place attacked in Britain, viz. on the 17th of December, and it raged at the same time in Switzerland, at Basle. It appeared at London and in Flanders the first week in January; towards the middle of the same month it reached Paris, and Ireland towards the end. Cornwall and Devonshire were visited about the beginning of February; few only were attacked at Plymouth, where Huxham practised, so soon as this: but in March it prevailed on all sides. In February Leghorn was attacked, and near the end of it Naples and Madrid suffered. New England in America was invaded by the distemper about the middle of October, which travelled southward to Barbadoes, Jamaica, Mexico, and Peru, much at the same rate as it had done in Europe. It appears to have been at Paris early in the year. "Elle se manifesta, dit de Jussieu, à la suite de brouillards fétides, plus épais que les ténèbres de l'Egypte." (Edinb. Med. Essays, vol. ii. p. 31. *Huxham*, de Aere, &c. tom. i. Dict. des Scien. Méd. art. *Grippe*.)

The epidemic catarrh of 1733 was followed by those of 1741 and 1742; the first described by Haller, and the second by Sauvages and Huxham. In 1743, towards the end of April, Huxham says that it was general in England, and in the spring spread over all Europe under the name of "influenza," or "grippe." This epidemic was the *precursor* of the plague of Messina in Sicily the same year; and it was more fatal in the southern parts of Europe than in England, though it increased the deaths in London in one week to a thousand. (De Aere, &c. tom. ii. p. 104.)

The next remarkable visitation of the influenza was in 1762; and an elegant description of it is given by Sir George Baker, "De Catarrho Epidemico anni 1762," who records its appearance in London about the 4th of April. Razoux, a physician of Nismes, has given an account of the same disease, which was epidemic in Europe generally in the spring. (Dict. art. *Grippe*.) It attacked Breslau at the end of February; Vienna was visited in March, and Hamburg in April. In Venice it was more fatal than in other places. It spared, however, Paris and the greatest part of France; nor can we find any particular cause for this exemption. Nismes most probably was visited; and Webster says that "Toulon lost one third of its inhabitants by an epidemic in 1761." The influenza of 1762 appeared sooner in London than in any other part of England, namely, the beginning of April. It was not observed in Edinburgh and Dublin till May; but in June it was general and severe, according to Sir G. Baker, being seen no where earlier than February nor later than July. It had prevailed in America the preceding year. (Webster's Hist. i. p. 410.) It was not till July that it attacked the British sailors in the Mediterranean. It was immediately followed in London by an epidemic dysentery, which raged till November. While the influenza prevailed, the deaths in London scarcely exceeded the usual number. In Manchester they were even fewer than common; and at Norwich far more died of it than fell victims to the *more severe* influenza of 1743. (*Baker*, de Catarrho, p. 33.)

The next epidemic catarrh, in order of time, was that noticed in London and different parts of the nation by Dr. Fothergill and some of his friends in the latter end of the year 1775. It was observed also in France, Holland and Germany, and was supposed to be more fatal in those countries than in Britain. (Lettsom's Memoir of the Life of Fothergill, 4to.; and Med. Obs. and Inquiries, vol. vi.)

The influenza of 1782 was general over England, Scotland, and Ireland, between the months of May and July inclusive. A full account of it is given in the second volume of Memoirs of the London Medical Society, by Dr. R. Hamilton, which is the groundwork of the article "Influenza" in the Edinburgh Medical and Surgical Dictionary; an account is also given in the first volume of Medical Communications by Dr. Gray, compiled from papers in the British Museum, which is the basis of a like article in the Cyclopædia of Dr. Rees. (See also the third volume of Transactions of the College of Physicians, London.)

The influenza of 1782 seems to have pursued a course from the east, not very different from that of the epidemic cholera which is now (1832) displaying its ravages in Great Britain and France. It is reported to have broken out in September 1780, and to have become very general in the crew of the Atlas East Indiaman, whilst that ship was sailing from Malacca to Canton. When the ship left Malacca, there was no epidemic disease in the place; when it arrived at Canton, it was found that at the very time when they had the influenza on board the Atlas in the China seas, it had raged at Canton with as much violence as it did in London in June 1782, and with the very same symptoms. In October and November 1781 it appeared in the East Indies, and

was said to have attacked the British army while it was besieging Negapatam in November 1781. Its progress is stated by Webster, to have been from Siberia and Tartary westward. At Moscow it prevailed in December 1781; at Petersburgh in February 1782; and it was traced to Tobolski. It was in Denmark in the latter end of April. From the shores of the Baltic it spread to Holland and the Low Countries, and thence to England. London was said to be attacked sooner than the west and north; Ireland a few weeks later, and the south of Europe later still; for it prevailed in France in the months of June and July, in Italy in July and August, and in Portugal and Spain in August and September; seldom continuing longer than six weeks in any place.*

The influenza of the spring of 1803 afforded an occasion for collecting a great number of notices from different parts of the country on the subject of this epidemic. The London Medical Society set a laudable example by proposing a set of queries to its corresponding members in a circular letter; and the sixth volume of "Memoirs" contains reports from nearly sixty practitioners in England, Scotland, and Ireland, as to the date of its first appearance, its symptoms, treatment, &c. in their respective neighbourhoods. Dr. Beddoes also interested himself very zealously on the same occasion, and procured various testimonies from his friends and others, which, to the number of one hundred and twenty-four, are inserted in the ninth and tenth volumes of the "London Medical and Physical Journal." These documents contain a mass of very useful information. This epidemic was observed at Paris and in other parts of France and in Holland some weeks before it appeared in London; and Dr. Bardsley says "the same length of time was occupied in its progress from the latter city to Manchester." (Med. and Phys. Journ. vol. ix. p. 529.) Its course seemed to be from S. to N. It was in Cork and Dublin before it reached the north of Ireland, immediately after a S. E. wind. An epidemic ophthalmia followed it in France, (Dict. *ut supra*,) and a severe dysentery, such as had not been known for thirty years, in some parts of the United States, which it visited the same spring. (New York Med. Repos. 2d Hex. vol. ii. p. 141.) It was observed to be *epidemic* in Sussex, and some of the counties in the S. W. as early as February; in Shropshire, Nottinghamshire, &c. in March; in Yorkshire and Lancashire in April; and at Sunderland in May. (Mem. of Med. Soc. of London, vol. vi.) It was evident that there was a degree of progressive movement northward, by marking the time when it was at the height in each place; yet many of the accounts above alluded to inform us clearly that sporadic or solitary cases exhibiting the true characters of influenza, occurred in several places long before the disease became established, so as to manifest a universal tendency to that form of complaints over the country, in some cases weeks before it was quite developed. It is worthy of notice that this has been remarkably the case with the epidemic cholera. Dr. Gray observes that, in 1782, a complaint, similar to the influenza, was taken notice of in some parts of the kingdom *several months* before that disorder made its progress through it. (Med. Commun. vol. i. p. 6.)

The influenza of last year (1831), though generally mild in its character, was almost universal; for it would seem to have prevailed in both hemispheres in the same year. Accounts have been received of its appearance in India as well as in the United States of America. (American Journ. of Science, &c. vol. xxi. No. 44, p. 407.) In many places it has been the precursor of the epidemic cholera. About a month before the latter disease broke out in Warsaw, it prevailed in that city. (Brierre de Boismont sur le Cholera, p. 110.) It also swept over great part of England, Scotland, and Ireland, in the spring and autumn, and preceded the *milder* visitation of epidemic cholera which many parts of Great Britain experienced the same year. Late in the autumn it attacked Paris, the south of Spain, Gibraltar, and Italy, with more severity than it did the British islands. At Rome it was said to occasion great alarm. It has certainly skipped over many countries of Europe in its march from Poland to France through England, so far as we can judge negatively from the want of official reports; but, with this exception, it has pursued a course not widely different from that of similar former epidemics, and has proved to be a true herald of the epidemic cholera in many places.

[In the epidemic of 1831, according to Most, (art. INFLUENZA, in *Encyclop. der gesammt. Medicin. und Chirurg. Praxis*, Leip. 1836,) 30,000 people, it was asserted, were suffering at the same time in Berlin; and, at a later period, 45,000 in Paris. Another severe epidemic prevailed in Europe and the United States in 1837; and another in 1843. Of the European epidemics of 1831, 1833, and 1837, the two first were less severe, and attacked fewer individuals than the last.]

II. The influenza does not seem to have exhibited a greater variety of symptoms, in its different visitations, than other epidemics. It has varied a little in town and country, in spring and autumn, at the beginning and end of the epidemic, in different persons, and according to the particular *genus* or tendency of the epidemic constitution; but still it has maintained some prominent characteristics of its identity at different periods. The ordinary course of the disease has been marked by the following symptoms:—it usually commenced with slight chills, amounting sometimes to shiverings, and alternate flushings of heat, with languor and sense of extreme weariness: then, soreness over the eyes, or pain in the course of the frontal sinuses: these were quickly followed by frequent sneezing, a copious discharge of lymph or thin clear fluid from the nose and eyes, sometimes so acrid as to excoriate the upper lip; heat and soreness in the top of the larynx and œsophagus, and along the course of the windpipe, with hoarseness and dry cough; sense of stricture in the chest and difficulty of breathing, sometimes attended with darting pain in the muscles subservient to respiration; weight and anxiety about the præcordia, flying pains in the back, knees, calves of the legs, and various parts of the body; depression of spirits, and sudden

* Transactions of the College of Phys. vol. iii., and Med. Communications, vol. i. Rees' Cyclopædia, Art. *Influenza;* and Trotter's Med. Nautica, i. 362. Observations on Dis. of Seamen, by G. Blane, M. D. p. 151.

and extraordinary prostration of strength. The tongue was mostly covered, at an early period of the complaint, with extremely white mucus, like cream—a symptom particularly noticed by Huxham, Baker, Pettit, and others: there was loss of appetite, the thirst was inconsiderable, and the pulse generally quick, weak, and soft.

The preceding symptoms appeared in various degrees and combinations, as the violence of the disease fell more particularly upon the mucous membrane, in the head, in the throat and chest, or in the stomach and bowels. When the disease chiefly affected the head, vertigo, violent headach, greatly increased by the cough, and delirium, were not unfrequent: there was hemorrhage from the nose, and pain in the ears; from which, in one case, a clear fluid was poured out like that from the nostrils. (Med. Trans. of the College of Physicians, vol. iii. p. 69.) In some rare cases the tonsils and back part of the throat were inflamed, so that suppuration was the consequence. When the violence of the disease fell upon the lungs, as in old people, asthmatic patients, and those predisposed to phthisis, hemoptoe was not uncommon, and frequent troublesome cough which prevented sleep. It often degenerated into pleurisy and peripneumony. In common cases the cough became loose in three or four days. The stomach was affected with nausea in many, and vomiting in some; and a spontaneous diarrhœa relieved both head and lungs, and speedily cut short the complaint. But in many instances, and in several visitations of the epidemic catarrh, a morbid determination to the intestinal canal was manifest from the beginning; which, so far from being considered a salutary effort of nature to relieve the system in that way, required especial care in the treatment, and the utmost caution in the use of purgatives. The fever was generally mild in the day-time, and it increased in the evening; and it seldom abated till some critical amendment took place by perspiration or otherwise. There was little remarkable in the urinary secretion. The duration of the complaint was from a day or two to a week or fortnight. In some, the symptoms, after abating in two or three days, returned and raged with violence. The far greater part had critical sweats about the third day, which, attended with free expectoration, banished the fever on the fifth day. One of the most remarkable features of influenza is the debility; so that many could not rise from the horizontal posture without sudden faintings, even in the state of convalescence; and the debility often remained for a considerable time. The suddenness of the invasion, the pain and tightness in the forehead, with pain in the back, knees, and muscles, and singular prostration of strength, were thought to be distinguishing marks between the influenza and common catarrh. Indeed, the pain or soreness in the face, temples, and cheekbones, was considered the most certain pathognomonic symptom in 1782; "and now and then was felt previously to the catarrh, and not unfrequently was followed by very little or no catarrhal affection."

In one district in Gloucestershire, a practitioner states that "in no two persons in 1803 did he observe precisely the same symptoms." (Med. and Phys. Journal, vol. x. p. 309.) If this was the case, the symptoms might be expected to vary considerably in different places, as well as in different visitations of the distemper. And this has happened accordingly. The rarer occurrences were, an unusual disposition to sleep, strangury and bloody urine independent of blisters, *peculiar slow and strong pulse*, with excessive debility, as at Newark; ringing in the ears and abscess, and abscess in the frontal sinus; of which last Dr. Rush had three cases in 1790. (Trans. of Col. of Phys. iii. 68, and Rush's Med. Inquir. ii. 354. Mem. of Med. Soc. vol. vi. p. 383.)

The duration of influenza in any one place seldom has exceeded six weeks. Upon the whole few have died of this complaint, although it has often attacked more than one-half or even three-fourths of a whole community. The chief victims have been the aged and asthmatic, those of tender lungs and of full oppressed habits. Those of middle age were more liable to be affected than old persons and children; and persons exposed to the air than those who were confined. Many recovered their strength very slowly, and some, especially in 1762, fell into incurable consumption.

[Some epidemics have, however, proved extremely fatal. The mortality of the epidemic of 1837 in Europe was greater than that from cholera, although the disease was by no means so severe, or so rapidly fatal. This was owing to its attacking almost every one, whilst the ravages of cholera were comparatively limited. It has been estimated by Dr. Graves (*Clinical Lectures*) that in Dublin alone, 4,000 persons died of the influenza of 1837.]

III. One general observation seems to apply to almost every epidemic disease, including even those of a pestilential nature, viz. that during its prevalence numbers are attacked in so slight a manner as to require but little medical care. Hence the influenza, which in all its visitations has had a favourable character in the majority of cases, has been easily removed by mild diluents, rest, and abstinence for a few days from animal food and fermented liquors. Besides this, a complaint so various not only in its symptoms but in the degrees of their intensity, modified too at different periods by season, climate, and epidemic constitution, would of necessity call for the exercise of much discretion in the employment of remedies. But, making due allowance for all this variety of character in the complaint, and for the judicious adaptation of a corresponding treatment, physicians of eminence, in different countries, seem to have agreed remarkably in their testimony as to the general rules and principles of their practice; and from the very beginning of the sixteenth century, in their reports, with respect to bloodletting, to the caution about active purgatives, to the employment of a cold regimen, and to the restricted use of opiates, there is a very striking and satisfactory coincidence.

In the mild attacks of the disorder, few if any medicines have been required. In severe cases emetics at the beginning relieved the sufferings of the head and chest, and, combined with gentle aperients and antimonial or saline medicines, were found useful in mitigating the fever and promoting a salutary diaphoresis.

No observation is to be found more general in practical writers in this disease than that bloodletting could rarely be employed with safety, far less with benefit, on account of the alarming debility and weakness of the pulse; and when it was strongly indicated, practitioners were sparing in the quantity of blood, and cautious in repeating the remedy. In the epidemic of 1510, Dr. Short tells us that "bleeding and purging did harm." In 1557, bleeding was said to be so fatal, that in a small town near Madrid two thousand persons died after it in September. In 1580, Sennertus ascribes the death of two thousand persons in Rome to venesection, and states that, where it was omitted, the mortality was not greater than one in a thousand. "Experientia enim hoc comprobavit, omnes fere mortuos esse, quibus vena aperiebatur." Forestus, in his Scholia on the same epidemic, suggests a good practical hint, that we ought to distinguish very carefully those cases which might require, from those which might not bear this remedy. Huxham, who had no prejudice against bloodletting, remarks, "Imo, si vel peripneumoniæ aliquid subesset, minime largam, sine maxima virium ruina, plus vice simplici venæsectionem tolerabat: *nec in hac solum, sed in omni febre catarrhali epidemica hoc fere perpetuum notavi.*" (De Aere, &c. ii. 102.) In Edinburgh it was noticed that those who were bled, in 1733 and 1782, "recovered more slowly;" though others at the commencement seemed to be relieved by the lancet. (Med. Essays, vol. vi. p. 29.) In the influenzas of 1733, 1775, and 1803, in France, bloodletting was generally injurious. (Dict. des Sc. Méd. *Grippe*, pp. 356, 359, 363.) Dr. Glass reports that at Exeter, in 1775, venesection "weakened the patient without relieving the pain;" and Dr. Ash considered that "it was never necessary to bleed at Birmingham; that in a neighbouring town, three died who were bled, and all recovered who were not bled." (Lettsom's Mem. of Dr. Fothergill, 4to. p. 627.) Dr. Gray gives it as a general inference from the accounts transmitted to a "Society of Physicians" in 1782, "that bloodletting was by no means conducive to the general cure of the disease." (Med. Com. vol. i. p. 80.) Many physicians bear testimony to the same good rule of practice in the influenza of 1803, as Dr. Bardsley of Manchester, Dr. Kinglake of Taunton, Dr. Rutter of Liverpool, and others. (Med. and Phys. Journ. vol. ix. and x.) Notwithstanding the foregoing authorities, it is admitted by some eminent physicians, that cases now and then occurred in which this remedy was useful. Sir George Baker made this observation in 1762, in London (p. 29); and in the same city it is somewhat remarkable that in the epidemic of 1775 it was less hurtful than in other places, which was perhaps owing to the more frequent complication of the disease that year with pleurisy and peripneumony, at all times no unusual circumstance.

Opiates at the commencement of the disease almost invariably increased the febrile heat, aggravated the headach, in some cases even to delirium, tightened the chest, and stopped the expectoration: but in the decline they proved salutary. A cool temperature, both in drinks, in the air of rooms, and in the quantity of bed-clothes, was found to be useful; while, on the contrary, warm rooms hot drinks, and cordial sudorifics, aggravated the violence of the disorder. Blisters to the chest, sides, or back, often greatly relieved the stitches and cough; and ipecacuanha was much extolled, especially in France, for its efficacy, when given in small doses, in assisting expectoration, relieving the oppressed lungs, and correcting the tendency to irritation of the mucous membrane of the bowels. A medicine often used with good effect to ease the cough when attended with viscid phlegm, was the solution of gum ammoniac combined with oxymel of squills. When recovery was tedious and the strength much impaired, even long before the cough was removed, some bitter infusion, such as that of calumba, cascarilla, or Peruvian bark, with wine-whey and some nutritious diet was of great service. The reason why purgatives have been so generally reprobated by practitioners in the influenza, appears to have depended on the fact, that a morbid state of the mucous tissue of the internal surfaces exposed to the air, was often closely connected with a morbid tendency in that of the alimentary canal; and, therefore, drastic purgatives, though they might relieve one system or set of organs, yet too often only transferred the disease, as it were, to another, and produced a dangerous debility.

[Lobelia inflata was recommended by Dr. Cartwright of Natchez, (*Medico-Chirurg. Rev.* for April, 1837, p. 586,) for the not very cogent reason, that "in those diseases affecting the mucous lining of the bronchial tubes, the lobelia inflata comes as near being a specific [?] as tartar-emetic and the lancet in pneumonia and pleurisy." Lobelia, as elsewhere said, (*Practice of Medicine*, 2d. edit. i. 263, Philad. 1844,) is certainly a valuable sedative, but not deserving of the elevated rank that has been assigned to it. The diseases of the bronchial tubes differ, and no one remedy can be applicable to every pathological condition. When there was more than usual inflammation of the bronchia, in the epidemic of 1837, large doses of the ethereal tincture of lobelia, repeated at short intervals, with counter-irritation, seemed, according to Dr. Blakiston, to be useful.]

IV. Among the phenomena relating to the weather, which seem to have had a connection with epidemic catarrh, either as precursor or attendant signs, we may notice extraordinary vicissitudes, easterly winds, thick or offensive fogs, and diseases, often of a similar kind, among horses, dogs, and cattle. Epidemic catarrh is a disease either of spring or autumn. The spring influenzas have sometimes occurred when the first heat suddenly followed the winter's cold; and the autumnal, when the cold moisture and raw fogs of November have succeeded to the heat of a dry harvest; yet there has not been a uniform connection between any one sensible quality of the atmosphere as to heat or cold, rain or drought, wind or calm, and the prevalence of this epidemic; for in different places it has maintained itself under the dominion of each of these states of the weather, "et tempori frigidiori et calidiori, et flante tam austro quam Borea, et pluvioso et sereno cœlo, peragravit hasce omnes Europæ regiones, et omnia loca indiscriminatim." (*Salius Diversus*, cited by Dunning, Med. and Phys. Journ. x. p

143.) In fact, extraordinary vicissitudes have been more remarkable than any thing else: in some places, one peculiar sign of atmospheric intemperature has been observed, and in other places a different sign; and the epidemic has frequently fallen capriciously or partially, like the blight over a country, or even over a garden.

Short says that "thick, ill-smelling fogs preceded, some days, the epidemic catarrh of 1567. July, August, and September had been very hot and dry; and in the end of September came a very strong cold north wind." (History, &c. vol. i. p. 223.)

Riverius, quoted by Saillant in his History of Catarrhal Epidemics, says that just before that of 1580 appeared in France, (at Nismes or Montpelier?) "a prodigious quantity of insects appeared in April and May; and the roads were covered with them in such a manner, that a person in walking might have destroyed them by thousands." (Dict. des Sc. Méd. tom. xix. p. 359.) And Petrus Salius Diversus, cited by Dunning, tells us of the birds and brute animals suffering generally the same year. (Med. and Phys. Journ. x. 143.) To these facts we may add the observation of Short, that "after a long continuance of hot, moist weather, attended with southerly winds, at the rising of the dog-star came a cold, dry, north wind; and from the middle of August to the end of September raged the malignant epidemic catarrh." (Hist, &c. i. p. 260.) Great extremes of the weather preceded the epidemic catarrh of spring 1658, decribed by Willis, (Ibid.); and Sydenham attests that "the epidemic catarrh of autumn 1675 immediately succeeded cold and moist weather, which suddenly followed an unusually warm summer." (*Syd.* Opera, sect. v. ch. 5.)

We have no very particular account of the state of the weather in England attending the epidemic catarrh of autumn 1729; but Hoffmann does not hesitate to ascribe its origin in Germany to the uncommon "irregularity and frequent changes of the weather from heat to cold and from cold to heat, &c. which distinguished that and the preceding year, such as he had never before witnessed; causing throughout all Germany, Belgium, England, and elsewhere, unusual sickness: "tam uberi proventu enati fuerint morbi, quam vix alio tempore visum unquam." (*Hoffmann*, Op. tom. ii. pp. 83, 109.)

Within the last century the number of observations on the phenomena in question increases very considerably; and we are thus enabled to make some approximation to general principles. Saillaint's excellent work, (Tableau des Epidemics Catarrhales, depuis 1510, jusque celle de 1780), on the continent, and the facts which have been collected in this country, on the catarrhal epidemics of 1775, 1782, and 1803, afford us much assistance in this inquiry.

De Jussieu says that "the influenza of spring 1733 appeared in France immediately after offensive fogs, *more dense than the darkness of Egypt*," (plus épais que les ténèbres de l'Egypte. (Dict. Art. *Grippe*.) Huxham remarks generally that the cause of epidemic catarrh seems to depend on a thick, moist, and cold air; and that in the autumnal months preceding the spring catarrh of 1733, epidemic diseases were very common and fatal among horses. (De Aere, &c. tom. i. pp 73, 75.) We find, also, that about Edinburgh coughs and running from the nose in horses were universal in October and November, just before the disease attacked men. (Med. Essays, ii. p. 31.)

The influenza of spring 1743 was the precursor of the great plague in some parts of Sicily. In England it was not so severe and fatal as in some other parts. About Plymouth, according to Huxham, many horses were diseased, and deer perished in January. (Webster's Hist. i. 386; and Huxham, op. cit. ii. p. 95, &c.)

Sir G. Baker says that the weather in spring 1762, before the epidemic catarrh of that year broke out in London, was extremely irregular; wind, frost, snow, and rain following each other in rapid succession, and with unusual severity. In April and May, intense heat followed; and beside this, the air underwent very sudden changes from heat to cold and from cold to heat. (De Catarrh. Epid. p. 7.)

A hot dry spring and summer preceded the epidemic catarrh of autumn 1775. Petit says that in France the disease was ushered in by thick noisome fogs ("brouillards fétides"), and a cold rainy autumn. (Art. *Grippe*, Dict. p. 359.) Dr. Anthony Fothergill says that disease among dogs and horses was general over England before the influenza broke out, (Mem. of Med. Soc. vol. iii. 36); and we are also assured that it was preceded by foggy air as well as by disease among dogs and horses in Dorsetshire, and at Exeter; and by unusual haze, easterly winds, and almost universal cough among the horses in North Wales. (See the Reports of Drs. Pulteney, Glass, and Haygarth, in Lettsom's Life of Fothergill.) About the 7th of October, 1775, it appeared in the shire of Galloway in Scotland; "and a continual dark fog and particular smoky smell in the atmosphere prevailed for five weeks, the sun was seldom seen, and though October and November are particularly rainy months in that country, little or no rain fell, the wind E S E. and S." (Mem. of Med. Soc. vol. vi. p. 323.)

With regard to the influenza of spring 1782, "the spring of this year was remarkably late, with a long prevalence of cold easterly winds; the hedges were not full blown in Cornwall before the beginning of June. A similar state of weather has commonly ushered in this universal malady." (Trotter's Med. Naut. vol. i. p. 362.) Dr. Hamilton tells us that "from the first of January till the end of May, throughout most places in the kingdom, the weather was uncommonly unfavourable;" and it appears that the latter month "*was remarkable in all the meteorological annals of Europe for its unusual degree of cold and humidity, with a gloomy and uncommonly disturbed state of the atmosphere.*" (Mem. of Med. Soc. vol. ii. p. 433 and 445.) Dr. Darwin adds his testimony, that in this year (1782) "the sun was for many weeks obscured by a dry fog, and appeared red as through a common mist:" and he supposes, "the material which thus rendered the air muddy, probably caused the epidemic catarrh which prevailed in that year." (Zoonom. c. ii. 1, 3.) Dr. Parr says that horses were affected with a cold at the same time, near Exeter. (Med. Comment. vol. ix. p. 414.) Maertens records a strik-

ing fact relative to the first appearance of this epidemic at Petersburg, and its connection with a particular change of the weather: "On a cold night the thermometer rose 30° of Fahrenheit; *the next morning* forty thousand people were taken ill with the influenza." (Med. and Phys. Journ. vol. x. p. 524.)

The influenza of spring 1803, as we have said, afforded an occasion for the collection of many valuable observations. It appeared in France some weeks before it invaded this country, and was supposed to be owing to a cold and humid autumn succeeding a dry and hot summer. At Paris it was immediately followed by a severe epidemic ophthalmia, about the time the influenza first appeared in Britain. (Dict. ubi supra.) With respect to unusual extremes in the weather, such are stated to have occurred in Hampshire, London, Somersetshire, and St. Andrews in Scotland, (Med. and Phys. Journ. x. 313, and Mem. of Med. Soc. vol. vi.) "I am of opinion," says Cuming, (Romsey, Hants,) "that the remote causes of this disease originated in the sudden change of atmosphere, a change, I believe, generally felt *throughout the United Kingdoms*, as well as upon the continent." Epizootic diseases preceded it, in some places among one or two species of animals only, in others among several, as cats, dogs, horses, cows, sheep, swine, in Shropshire, Worcestershire, Staffordshire, Cumberland, Hampshire, Lancashire, &c. (Ibid. pp. 288, 379, 316, 414, 426, 444, 482, 576.) At Plymouth "many attributed the disorders among the horses to their having eaten insects, which for many weeks were innumerable, and covered the fields in a most extraordinary manner whorever there was any length of grass; and this, from the mildness of the season, was general in almost every field." (Med. and Phys. Journ. x. 137.)

Disease was very prevalent among sheep in some parts of the north of England, last spring (1831), just before the influenza appeared; and an epidemic catarrh seems to have raged among horses in the south later in the year. The influenza of this year was remarkable for this, that it prevailed in some parts of Great Britain in spring, and in other parts in autumn. Its character was generally mild in all. With regard to the weather, an intelligent captain of a regular trader in the English channel declared to the writer of this article, that for thirty years past he had no recollection of such a long continuance of a thick and foggy atmosphere, as he has had occasion to observe within the last eighteen months, between this country and the south of Ireland. He went so far as to state that he had scarcely made one clear passage from Liverpool and back again during this whole period.

One general inference offers itself to our notice on reviewing the foregoing facts, viz. that no particular phenomenon in nature universally characterizes the epidemic constitution which precedes, or that which accompanies the disease called influenza; and we are led to conclude that the causes of this epidemic, supposing them to take their rise in atmospherical changes of a universal nature, are far from being marked by uniformity in the signs At the same time we are bound to admit that the changes from warm weather to cold, and from cold weather to warm, with dampness, fogs, and easterly winds, have rarely been absent from the catalogue of natural indications. Disease among domestic animals is also to be noted as a very common precursor in many places, and in several distinct visitations of the influenza.

[Dr. Graves (*op. cit.*) suggests that the disease may depend chiefly on telluric influence, or upon some agency connected with variations in the physical conditions, which operate on the external surface of the earth. The suggestion only indicates the little knowledge we have of the subject.

In regard to the nature of the disease, various opinions have been entertained. Essentially it consists of the collection of symptoms to which the names of catarrh and bronchitis are applied; but along with these, especially in the influenza of 1837, the nervous system has been implicated. By one of the writers on the epidemic, Dr. Blakiston, it has been designated "an affection of the nervous system, with its concomitant derangement in the organs of digestion, and circulation commonly known under the name of nervous fever, accompanied throughout its whole course by irritation of the pulmonary mucous membrane," and this view seems to have been embraced by most writers on the subject. Andral, however, (*Cours de Pathologie Interne*,) concludes that it is a general affection, the nature and cause of which are as unknown as those of the greater part of epidemics, which appear at irregular epochs.]

V. The influenza, like every other epidemic disease, has given occasion to medical observers to entertain very opposite views on the question of its contagious property. Were we to draw a general inference from the recorded statements of the majority, we should say that it was *not* contagious; for the numbers who have given an opinion on this side far exceed the advocates of contagion. But we must not appeal to the majority in order to decide a principle in science. It must, however, be acknowledged, that while individual or partial occurrences might lead to the supposition that influenza was propagated in many instances by contagious transmission, a comprehensive survey of facts goes far to establish the contrary opinion; for some things can hardly be explained on the principle of contagion without having recourse to suppositions that could not be warranted by a sound induction. Upon the whole it would appear that some general cause, if not originating, at least subsisting in the atmosphere, and depending on its changes, progressive also in its movements from place to place and from country to country, gives rise to the disease; but that it is probable that a limited propagation *also* takes place by personal intercourse, *under the influence, and during the prevalence, of the epidemic constitution.*

We have writers affirming that persons who have been visiting or on business in an *infected* town, have been the first to introduce the epidemic into their own town or neighbourhood; and it cannot be doubted that the members of a family and the inhabitants of a district have often been attacked by the influenza *in succession.* Hence these things would seem to indicate that the disease was propagated by contagious transmission

more than by some universal medium. But the difficulty of proving the first to be actually the case, must, in the nature of things, be very considerable; for it would appear,—and the remark applies to almost every epidemic disease,—that in many places a tendency to the epidemic has been recognised by clear indications some time *before* the peculiar combination of symptoms which characterize it have shown themselves, making the moment of actual invasion very doubtful; just as, it is well known, the epidemic imprints its own character for some time *after* upon the diseases that follow it. And though no *epidemic* disease with which we are acquainted is so sudden and simultaneous in its attacks as influenza, and therefore none more emphatically deserves the name of *epidemic*, nor more decidedly proves a universal cause; yet it is a striking fact that, with all its frequent rapidity of movement over the globe, it has in almost every country been more or less obedient to the laws which govern other epidemics, according to some *progressive* and *consecutive* operations that are as much hidden as the efficient cause of attraction. It does, in fact, mostly observe some progressive law in moving over a country and in attacking a given multitude of people, which demonstrates that, however universal may be the cause of an epidemic disease in its purest form, yet if we regard experience, the effects rarely if ever should be expected to appear without some degree of consecutive order. The difference of constitution, of age, of habits, of locality, and of other things, may be quite sufficient to account for the phenomenon of successive attack; and indeed it is what we might expect *à priori*. If to this we add the probability, and, indeed, necessary inference from the facts, that the cause itself is developed gradually, we shall have less difficulty in accounting for a continuous mode of attack on another principle than that of contagion.

Though a successive mode of propagation over a country or city is most usual, yet on some occasions the spread of influenza over a whole kingdom, within the space of a few days, has been so general as to make the propagation by means of personal intercourse quite incredible, and almost impossible. Besides this, its sudden appearance in ships at sea, which have had no intercourse with land or with other vessels for a considerable time, can hardly be explained on any other supposition than that of its atmospherical origin. Dr. Anthony Fothergill assures us that "both the epidemics of 1758 and 1775 seized whole families on the same day, often remote from one another, and without any intercourse. (Memoirs of Med. Soc. vol. iii. p. 36.) Again, "the influenzas of 1775 and 1782 seized some persons at sea, while others were attacked on shore, and that without any perceptible communication." (Ibid. 38.) "The appearance of the Influenza in 1803, in England," according to Dr. Woodforde, "was very sudden, and its attack extremely general, so that it is difficult to say in what or in how many parts of the kingdom it prevailed at first. It is probable that the disease broke out in all at or nearly the same time." (Med. and Phys. Journ. vol. ix. p. 505.)

The following fact is very conclusive as to the operation of some general cause; for it is scarcely probable that contagion could be lurking a long time before, and then should burst forth at the same time in distant points in so remarkable a manner. Two separate fleets left the coast of England for different points of destination in the year 1782; one, under Admiral Kempenfeldt, on the 2d of May, to cruise between Brest and the Lizard; the other, under Lord Howe, on the 6th of the same month, for the Dutch coast: neither fleet had communication with any shore; and the crews of each were perfectly healthy on sailing from Spithead. But on the 29th of the month, near four weeks after, the crew of the *Goliah*, one of the ships under Kempenfeldt, was attacked with influenza, and about the same time the epidemic appeared also in the *Rippon*, under Lord Howe. The other ships of both fleets were attacked in succession. In fact, so many men of both squadrons, on these remote stations, were rendered incapable of duty, that all were obliged to return to Portsmouth about the second week in June. (Transactions of the Col. of Phys. vol. iii., and Trotter's Med. Naut. vol. i. 364.)

If we pay attention to the course or direction of the several visitations of the influenza, we may observe that its general progress is not without some order. It either follows a westerly course, or one from the south towards the north. If its course be westward, it does not usually take extensive leaps over kingdoms, and then return to those it may have missed, as would be likely to happen if nothing more than personal intercourse and the various casualties of travellers' routes exerted an influence in determining its course. But it sweeps along the north from the east through Russia, Poland and the north of Germany to England; and then wheels round through France and Spain to Italy. And here we cannot but trace a striking resemblance to the career of the epidemic cholera. But if influenza arises in the south, it takes a course from Italy through Spain, France, Britain and the Netherlands, along the shores of the Baltic. In the one case France is attacked before England, in the other after it.

Were we to admit that the propagation of an epidemic disease over a space of some hundred square miles in the course of a few days or weeks might be accounted for on the doctrine of contagious transmission by means of travellers and the facilities of human intercourse, analogy might supply us with an argument against the admission; for in the case of some of the domestic animals, which do not travel from country to country like man, but are comparatively stationary, epidemic diseases are observed to spread among them; sometimes in as extensive and simultaneous a manner as amongst human beings.

VI. The facts we are now to notice seem to afford strong indications of the influence which the general cause that produces epidemic catarrh exerts over the human body with regard to other diseases; and so far they are opposed to the theory that contagion is the cause of it. Webster has remarked that catarrh or influenza is the disease which is most clearly connected with pestilence in the form of malignant angina, dysentery, yellow fever and plague, which it usually precedes. (See Hist. of Epid. vol. ii. p. 39 and 48.) This ob-

servation is partly confirmed by subsequent experience. These facts also show how the general cause is controlled or modified by local peculiarities, as well as by constitutional varieties.

Sir George Baker tells us, that "while the influenza of 1762 was prevailing in a very mild and tractable form in the villages near Lincoln, that were high and exposed, quinsies, pleurisies, and peripneumonies produced incredible destruction of life in the low neighbouring districts." (De Catar, Epid. p. 19.)

Dr. Carrick of Bristol says that "one of the most open and exposed of the buildings on Clifton Hill is Richmond Terrace, which forms three sides of a parallelogram, fronting respectively the east, south, and west. On the east side, not one family, scarcely an individual, escaped the complaint (in 1803), while on the south side a great majority both of persons and families, in all other respects similarly circumstanced, escaped it entirely."—(Young's Med. Literature, p. 575. See also Mem. of Med. Soc. vol. vi. p. 345.)

Dr. Binns states that at the time the scarlatina existed at Ackworth School in 1803, the influenza prevailed in the neighbouring towns; yet that the latter did not attack a single individual of the family at the school, consisting of between three and four hundred persons." (Ibid. p. 351.) Burton-on-Trent, also, in great measure escaped the influenza the same year; and scarlatina, with hooping-cough and measles, were epidemic there *in its place.* (Ibid p. 405.)

"In London the influenza of 1803 superseded or deferred the usual diseases of the spring, as the measles and scarlatina: this is also recorded by Lorry to have been the case in the epidemic catarrh that prevailed in France in 1775; but he adds, that during the summer these complaints appeared with more than usual violence and fatality." (Ibid. p. 520.)

"At Aberdeen the influenza of 1775 began near the end of November and continued four or five weeks, but did not visit Fraserburg, *where there was a putrid fever very fatal at that time.*" (Lettsom's Mem. of Fothergill, p. 642.) At Chester, according to Dr. Haygarth, "the same epidemic, in 1775, attacked many who were confined to their houses and even to their beds with other ailments." (Ibid. 637.)

Dr. Vaughan says, that at Rochester, when the influenza of 1803 ceased, "an exanthematous fever prevailed, which did not appear to attack any except those whom the influenza spared." (Mem. of Med. Soc. vol. vi. p. 589.)

Dr. Gibney reports that "at Navan in Ireland, after the influenza of 1803, a low fever, almost constantly prevailing in that town, disappeared for a considerable time." (Med. and Phys. Journ. vol. x. p. 527.)

Dr. Currie says that "at Holywell, a populous town eighteen miles from Chester, and where there is a large cotton manufactory, a typhous fever of uncommon malignity had prevailed for a considerable time: the manufacturers and inhabitants of the town had not been free from it for more than two years. On the appearance of the influenza in the spring of 1803, the typhus entirely ceased, and only one case of fever has occurred since (nearly three months). I have not for many years known this country so healthy as since the influenza disappeared." (Ibid. p. 214.)

Dr. Rush remarks that, during the prevalence of the influenza at Philadelphia, he saw no sign of any other epidemic, and that the scarlatina anginosa, which prevailed during the summer, disappeared after the 1st of October, but appeared again after the influenza left the city. It blended itself with every species of chronic complaint." (Rush's Med. Inquiries, vol. ii.)

"The influenza was *the precursor* of the malignant yellow fever, which, commencing in the beginning of September, 1802, at Port Royal and St. Pierre's, Martinique, among the French seamen and soldiers lately arrived from France, committed the most frightful devastations amongst them." (Mem. of M. S. vol. vi. p. 599.)

"During the prevalence of influenza at Vienna, from December 1788 to May following, there were scarcely any instances of real pleurisies or peripneumonies, though these often appeared during that season in former years." (*Dr. Carenus*, Med. Comment. vol. xvi. p. 161.)

Dr. Chisholm mentions the exemption from the severe influenza of 1789 in its malignant form, *after a remarkable change in the weather*, of some estates in the island of Grenada, which had been attacked by it in its milder character *before the change took place.* (Med. Com. vol. xv.)

While the influenza of 1762 was in London, peripneumony and angina were unusually and almost universally prevalent in the country, (*Sir G. Baker*, de Cat. Epid. p. 18); and Dr. Carmichael Smyth relates, that "although the epidemical catarrh of 1782 quickly disappeared in the metropolis, it seemed to leave behind it an epidemical constitution which prevailed during the rest of the summer: and the fevers even in the end of August and beginning of September assumed a type resembling in many respects the fever accompanying the influenza." (Med. Com vol. i. p. 71.)

After the disease had continued some weeks, it was observed to change its character in several places. In Dublin Dr. Cleghorn remarked that the fever with which the influenza of 1782 was accompanied, became remittent, and sometimes intermittent; in London it was intermittent, at Stamford and the Isle of Man, "low and putrid." (Med. Com. vol. i. p. 25.)

We can scarcely look over the histories of influenza without perceiving a connection between this disease and morbid affections of the mucous surface of the stomach and intestines. Thus Huxham has recorded the frequent appearance of cholera and diarrhœa in July, September, and October, after the spring influenza of 1733. (De Aere, &c. vol. i. 86 and 88.) The same author describes the "dysenteria cruenta epidemica," which raged at Plymouth and the adjacent country, both before and after the influenza of 1743: and he adds that "he did not know whether the former disease might not be considered a translation of the latter to the intestines; but he had observed that *epidemic dysentery* was very rarely to be met with in the spring. (Ibid. ii. 99, 103.)

Sir George Baker follows up his account of the epidemic catarrh of 1762 in London with a description of the epidemic dysentery which imme-

diately succeeded it in that city, (Opus cit.); and both he and Dr. Reynolds remarked that in 1775 diarrhœa sometimes followed the attack of influenza. (Mem. of Fothergill, supra cit.)

Dr. Hamilton states that in the neighbourhood of Newcastle-upon-Tyne, "the influenza of 1782 was accompanied with colic pains and cramps in the region of the abdomen and stomach, and some had purging." (Mem. of Med. Soc. vol. ii. p. 435.)

In France, in the influenza of 1803, "gastric irritation was one of the most frequent complications of the disorder, and appeared in some measure to constitute an essential part of it." (Dict. des Sc. Méd. Art. *Grippe*, p. 362.)

Dr. Bertram of Hull remarked that some of the attacks of influenza in 1803 nearly resembled cholera-morbus, others cynanche tonsillaris; and he goes so far as to express "a firm conviction of the three diseases being different types of the same disorder, and occasioned by the same cause."—(Mem. of Med. Soc. vol. vi. p. 332.)

Diarrhœa seems to have preceded, as an epidemic, the influenza of 1803, at Plymouth Dock, as in 1743 and 1788; for Dr. May says that early in the year "diarrhœa and cholera were very prevalent; so nearly similar to that preceding the influenza of 1788, that to many of his friends he hazarded a pretty confident opinion of an expected return; and in this he was not deceived." (Med. and Phys. Journ. x. p. 291.)

It must be fresh in the recollection of most that the epidemic cholera which in a milder character appeared in many parts of Great Britain last year (1831), and is now running so fatal a career in its malignant type, was preceded by the influenza; and we know that the same herald of that formidable epidemic was seen also at Warsaw, Paris, and other places; and was lately announced even in the United States of America a short time before the cholera made its appearance in the transatlantic cities.

These facts are collected to show that there is a closer connection between some epidemic diseases, both as to their affinity and their causes, than we commonly imagine; and that it is only by a very enlarged view of their phenomena in different countries that we can hope to improve our knowledge in this obscure branch of science.

THOMAS HANCOCK.

INSANITY.—SECT. 1.—**Remarks on attempted definitions of Insanity.—Different varieties of the Disease referred to three principal Forms.**

Writers on insanity are generally agreed as to the difficulty of inventing a satisfactory definition of that disease. It is perhaps impossible to comprise in a few words a characteristic description of mental derangement which may prove to be of practical use; and it is not an easy matter to discover one that even includes all the essential features of the object which it is proposed to define. The latter of these requisites will be obtained if we describe insanity as consisting in "a disordered state of the functions of the brain, which gives rise to disturbances in the operations of the mind." This definition may correctly be applied to madness, but it also includes a variety of other diseases; and hence it becomes necessary to render the description more particular by exclusions and restrictions. It must be added, for example, that the disturbance in the mental operations ensuing from the morbid cause in the brain is not allied to coma or to loss of consciousness and sensibility, in order to exclude from the definition apoplexy and disorders of the same class. For a similar reason it has been common to observe that madness is a species of delirium distinct from that which is symptomatic of typhus and other febrile diseases. There are some other morbid states of the brain and of the faculties dependent for their exercise on the functions of that organ, which must in like manner be excluded by express limitations. Such are congenital idiotism, and the imbecility of old age. Now it is obvious that a definition loses all its utility when it is found necessary to encumber it with so many particular restrictions, and it is therefore better to give up the attempt to define insanity in general terms.

But the practical purpose of a definition, which is to give a clear and distinct conception of the thing to be described, will be secured if we can determine and classify the various disturbances which the mental operations undergo. These disturbances, however, present very different phenomena in different instances of the disease, and we cannot attempt to draw up a concise account of them until we have briefly noted their principal varieties.

It is generally supposed that the intellect or the reasoning faculty is principally disordered in persons labouring under mental derangement. Mr. Locke made a remark, that "madmen do not appear to have lost the faculty of reasoning; but having joined together some ideas very wrongly, they mistake them for truths, and they err as men do that argue right from wrong principles." From Mr. Lock's time it has been customary to observe that insane persons reason correctly from erroneous premises; and some instances of hallucination, or some particular erroneous impression, have been looked for as the characteristic of the disease, or an essential circumstance in it. Dr. Cullen seems to have had Mr. Locke's observation in his mind when he laid down the definition of madness which occurs in his First Lines. He describes this disease to be "in a person awake a false or mistaken judgment of those relations of things which, as occurring most frequently in life, are those about which the generality of men form the same judgment; and particularly when the judgment is very different from what the person himself had before usually formed." Cullen attempted to draw even this description within narrower limits, by observing that "there is generally some false perception of external objects, and that such false perception necessarily occasions a *delirium or erroneous judgment*, which is to be considered as *the disease*." That this is by far too limited an account of madness, and only comprises one, and that by no means the most frequent form of mental derangement, every person must be aware who has had opportunities of extensive observation.

Of those lunatics whose intellectual faculties are manifestly disordered, there is always a con-

siderable proportion in whose minds it is impossible to trace any particular hallucination or erroneous perception or recollection. The rapid succession of thoughts, the hurried and confused manner in which ideas crowd themselves into the mind in a state of incoherence, or without order and connection, is in very many instances among the most striking phenomena of madness. There are, likewise, cases of a different description, in which the intellectual faculties appear to have sustained but little injury, while the feelings and affections, the moral and active principles of the mind, are strangely perverted and depraved; the power of self-government is lost or greatly impaired; and the individual is found to be incapable, not of talking and reasoning upon any subject proposed to him, for this he will often do with great shrewdness and volubility, but of conducting himself with decency and propriety in the business of life. His wishes and inclinations, his attachments, his likings and dislikings, have all undergone a morbid change, and this change appears to be the originating cause, or to lie at the foundation of any disturbance which the understanding itself may have sustained, and even in some instances to form throughout the chief character or constituent feature of the disease. The older nosologists, Sauvages, Sagar, and Linnæus, were not wholly unaware of these distinctions; for in their distributions of mental diseases, we find (besides an order of *Vesaniæ* or *Hallucinationes*, in which erroneous impressions were supposed to affect the understanding) another department styled "*Morositates*" or "*Morbi Pathetici*," consisting of depraved appetites and other morbid changes in the feelings and propensities. The disorders, however, which are classed under these heads, are not, all of them at least, strictly forms of insanity; and Pinel appears to have been the first writer who, with a clear conception of the subject, distinguished a class of maniacal affections under the term of "madness without delirium or hallucination." Pinel, who was an acute and original observer, and whose opinions carry much weight on account of his extensive opportunities of investigating the history of madness, has made the following remark in reference to the sentiments of Mr. Locke. "We may justly admire," he says, "the writings of this philosopher, without admitting his authority upon subjects not necessarily connected with his inquiries. On resuming at the Bicêtre my researches into this disorder, I thought, with the above author, that it was inseparable from delirium," (meaning what is termed by English writers hallucination;) "and I was not a little surprised to find many maniacs who *at no period gave evidence of any lesion of the understanding*, but who were under the dominion of instinctive and abstract fury, as if the active faculties alone had sustained injury.

The examples given by Pinel in illustration of the above remark were not fortunately chosen, and they are all of one kind, namely, of that in which the principal phenomena of the disease were violent fits of anger or rage. The general observation which the author has so clearly enounced, that insanity consists, in certain cases, in a morbid perversion of the affections and moral feelings exclusively, and without any perceptible lesion of the intellectual faculties, is a fact of the highest importance pathologically and practically, and the opinion of Pinel in this particular deserves the most attentive consideration. It will be found that later practical writers, though they have not made the same statement in so decided a manner, have yet given a testimony which leads to the same result. The following remarks by M. Esquirol, who is less systematic than Pinel, prove that he was led to a similar conclusion by the strict observation of facts.

"The insane conceive an aversion for those persons who are most dear to them, revile them, illtreat them, anxiously shun them, in consequence of their mistrust, their suspicions, and their fears. Prejudiced against every thing, they are afraid of every thing. A few appear to form an exception to this general rule, in preserving a sort of affection for their relatives and friends; but this feeling of attachment, which is sometimes excessive, subsists without confidence in those persons who before the attack of the disease had been the directors of the thoughts and actions of the patient. A melancholic, who is devotedly attached to his wife, is deaf to her counsels and advice. A son would sacrifice his life for his father, but will not make the slightest attempt, in compliance with the entreaties of the latter, to overcome the morbid impression which occasions him so much grief."

"This moral alienation is so constant," says M. Esquirol, "that it appears to me to be the proper characteristic of mental derangement. There are madmen in whom it is difficult to discover any trace of hallucination, but there are none in whom the passions and moral affections are not disordered, perverted, or destroyed. I have in this particular met with no exceptions."

"A return to the proper and natural state of the moral affections," says the same writer, "the desire of seeing once more children or friends; the tears of sensibility; the wish manifested by the individual to open his heart and return into the bosom of his family, to resume his former habits, afford a certain indication of cure, while the contrary dispositions had been a mark of approaching insanity, or the symptom of a threatened relapse. This is not the case when there is merely a disappearance of the hallucination, which then only is a certain sign of convalescence, when the patients return to their natural and original affections." (*Esquirol*, Dict. des Sc. Méd., tom. xvi.)

If the opinion expressed by these writers is founded on real facts,—and that it is so the writer of the present article is well assured from ample proofs afforded by his own observation,—it must be evident that it leads to very important results. It will be necessary, in conformity with it, and with the varieties of phenomena which the disease really presents, to classify the different forms of madness or insanity under the following divisions.

1. Moral insanity, or madness consisting in a morbid perversion of the natural feelings, affections, inclinations, temper, habits, and moral dispositions, without any notable lesion of the intellect or knowing and reasoning faculties, and particularly without any maniacal hallucination.

2. Intellectual insanity, or madness attended with hallucination; in which the insane person is impressed with the belief of some unreal event as of a thing which has actually taken place, or in which he has taken up some notion repugnant to his own experience and to common sense, as if it were true and indisputable, and acts under the influence of this erroneous conviction.

3. There is another well-marked division of maniacal cases, in which the whole mind, if we may use the expression, seems to be equally deranged. The most striking phenomena in this form of the disease are the rapidity and disorder with which the ideas follow each other, almost without any discoverable connection or association, in a state of complete incoherence and confusion. It is impossible to fix the attention of the patient long enough to obtain a reply to the most simple question. His understanding is wholly lost in the constant hurry of ideas which crowd themselves upon him, and which appear to exceed the power of distinct utterance, while his habits betray a corresponding degree of restless activity and extravagance.

The most appropriate designation in our language for this species of disease is *incoherent madness*, a term given to it long ago by Dr. Arnold. It is named by Pinel *dementia* or *démence*, dementedness. Pinel has given an admirable definition of it: "Rapid succession, or uninterrupted alternation of insulated ideas, and evanescent and unconnected emotions; continually repeated acts of extravagance; complete forgetfulness of every previous state; diminished sensibility to external impressions; abolition of the faculty of judgment; perpetual activity."

If we are correct in assuming that all the varieties of mental derangement may find their place under one of the three descriptions we have thus marked out, a definition or short nosography of madness will be furnished by enumerating the characteristics of the three forms. We may then describe insanity as "a chronic disease manifested by deviations from the healthy and natural state of the mind; such deviations consisting either in a morbid perversion of the feelings, affections, and habits, or in disturbances of the intellectual faculties, under the influence of which the understanding becomes susceptible of hallucinations or erroneous impressions of a particular kind; or, thirdly, in a state of mental incoherence, or constant hurry and confusion of thoughts."

We shall now endeavour to trace an accurate description of the actual phenomena of insanity, containing the results of long and attentive observation. In discriminating the different varieties of the disease, we shall neither deviate further than is necessary from the arrangements of former writers, nor shall we follow in every respect the nosological divisions which they have adopted. The reader will, if we are not mistaken, find data in the following outline sufficient to confirm and illustrate the preceding remarks, and to show how far the distinctions we have endeavoured to establish are complete.

Sect. II. — Phenomena of Madness described.

1. *First Appearances of the Disease.*—The first appearances of madness are very different in the various forms of the disease and in different cases. Sometimes the complaint breaks out at once, without any previous indications; the manners of the patient are observed to be unusually impetuous; his conversation hurried; his mind full of projects, which he pursues with restless activity. He betrays the absolute derangement of his understanding by announcing some false and absurd impression, or by acting upon it. When his attempt is resisted, or when by accident he explains the motive which incited him, his condition is at once made evident, and the necessity of restraint becomes obvious. Such is the mode in which insanity makes its attack in the greater number of cases. In other instances the actual appearance of disturbance in the intellect is preceded by a period of uncertain duration, in which an unsound state of mind exists, but displays itself in a different manner. A certain waywardness or singularity of character, an unsteadiness in pursuits and inclinations, a fickleness or capriciousness of temper and habit, is observed for some time before the individual is set down by his relatives as a lunatic. This stage of the disease may last for years. M. Pinel mentions the case of a man who believed his wife to have been deranged only six months, at the commencement of which period she had sustained an attack of violent mania, but after repeated inquiries was at length convinced that she had not been in a sound state of mind for fifteen years. The same writer likewise observes that in many instances the origin of mental derangement has been referred, on tracing its history, to a period of four, ten, or even of fifteen or twenty years before the time when it became fully manifest, or when a disordered state, previously ambiguous, changed its character into that of ordinary or decided mania.

Cases of disease affecting the mind, such as we have described, and in which the succession of symptoms and the development of the complaint follow the order just pointed out,—a certain period either of melancholy dejection or of morbid excitement, attended with a disturbed and unnatural state of the feelings, temper, and habits, preceding, and after a time ushering in a clearly marked attack of insanity—are in fact only examples of a transition from one form or state of mental disorder to another, which is more strongly characterized and more easily distinguished. There are, however, numerous instances in which phenomena similar to those of the previous stage last for many years, perhaps during life, sometimes maintaining their ambiguous and undefined character, at others becoming aggravated in degree, but without undergoing a transition into the peculiar form of madness attended with marked disturbance of the intellectual faculties. Of this description are the cases of mental disease which we purpose to distinguish under the term of moral insanity.

First Form of the Disease.—Moral Insanity.—This form of mental disease has been said above to consist of a morbid perversion of the feelings, affections, habits, without any hallucination or erroneous conviction impressed upon the understanding; it sometimes coexists with an apparently unimpaired state of the intellectual faculties.

There are many individuals living at large, and not entirely separated from society, who are affected in a certain degree by this modification of insanity. They are reputed persons of singular, wayward, and eccentric character. An attentive observer may often recognise something remarkable in their manner of existence, which leads him to entertain doubts as to their entire sanity, and circumstances are sometimes discovered on inquiry which assist in determining his opinion. In many instances it is found that there is an hereditary tendency to madness in the family, or that several relatives of the person affected have laboured under other diseases of the brain. The individual himself is discovered in a former period of life to have sustained an attack of madness of a decided character. His temper and dispositions are found on inquiry to have undergone a change; to be not what they were previously to a certain time; he has become an altered man, and this difference has perhaps been noted from the period when he sustained some reverse of fortune, which deeply affected him, or since the loss of some beloved relative. In other instances the alteration in his character has ensued immediately on some severe shock which his bodily constitution has undergone. This has been either a disorder affecting the head, a slight attack of paralysis, a fit of epilepsy, or some fever or inflammatory disorder which has produced a perceptible change in the habitual state of the constitution. In some cases the alteration in temper and habits has been gradual and imperceptible, and it seems only to have consisted in an exaltation or increase of peculiarities which were always more or less natural or habitual.

In a state such as that above described, many persons have continued for years to be the sources of apprehension and solicitude to their friends and relatives. The latter in many instances cannot bring themselves to admit the real nature of the case. The individual follows the bent of his inclinations; he is continually engaging in new pursuits, and again relinquishing them without any other motive than mere caprice and fickleness. At length the total perversion of his affections, the dislike and even enmity manifested towards his dearest friends excite greater alarm. When it happens that the head of a family labours under this ambiguous modification of insanity, it is sometimes thought necessary from prudential motives, and to prevent absolute ruin from thoughtless and absurd extravagance, or from the result of wild projects and speculations, in the pursuit of which the individual has always a plausible reason to offer for his conduct, to make some attempt with the view of taking the management of his affairs out of his hands. The laws have made inadequate provision for such contingencies, and the project is often unsuccessful. If the matter is brought before a jury, and the individual gives pertinent replies to the questions that are put to him, and displays no particular hallucination,—a feature which is ordinarily looked upon as essential to madness,—it is most probable that the suit will be rejected.

Several practical writers have left a testimony, which is sufficiently conclusive, as to the existence of moral insanity, though they have not designedly and in set terms marked it as a distinct form of the disease.

We have already observed that M. Esquirol has stated his opinion to be, that moral alienation, or a perverted state of the affections, is, rather than intellectual aberration, the characteristic of mental derangement. M. Georget likewise describes the state we have alluded to as a particular modification of madness. He observes "that individuals predisposed to mental disease by a faulty education or by previous attacks, have often continued for a long time, or perhaps even during their whole lives, to attract observation by caprices in their deportment, by something eccentric in their manner and habits of life, by an ill-regulated fondness for pursuits of the fancy, and the mere productions of the imagination, combined with a striking inaptitude in the study of the exact sciences." The last-mentioned particular will scarcely be allowed to constitute a characteristic trait of madness in this country, whatever may be the case in France. "These persons are noted," continues the same writer, "for singularity of opinions, of conduct, for transitory fits of intelligence, or sallies of wit, which are too strongly contrasted with their habitual state of nullity or monotony; by a levity in thoughts, a weakness in judgment, a want of connection in their attempts at reasoning. Some individuals are presumptuous, desirous of undertaking every thing, and capable of applying themselves to nothing; others are extravagant and mobile in the utmost degree in their opinions and sentiments; many are susceptible, irritable, choleric, and passionate; some are governed by pride and haughtiness without bound; a few are subject to vague anxieties or to panic terrors."

It must be observed that, although M. Georget has described this state of disease as a first stage, or as the period of what he terms with M. Esquirol the *incubation* of madness, yet, as he says that it often lasts through the life of the individual, we may consider his testimony as given, in point of fact, in favour of the real existence of moral insanity as a particular modification of disease.

Individuals labouring under this disorder are capable of reasoning or supporting an argument on any subject within their sphere of knowledge that may be presented to them, and they often display great ingenuity in giving reasons for their eccentric conduct, and in accounting for and justifying the state of moral feeling under which they appear to exist. In one sense, indeed, their intellectual faculties may be termed unsound, but it is the same sense in which persons under the influence of strong passions may generally be said to have their judgment warped, and the sane or healthy exercise of their understandings impeded. They think and act under the influence of strongly excited feelings, and a person accounted sane is under such circumstances proverbially liable to error both in judgment and conduct.

We have already had occasion to observe that the existence of moral insanity as a distinct form of mental derangement has been recognised by Pinel. The following example recorded by that writer is a characteristic one:

"An only son of a weak and indulgent mother was encouraged in the gratification of every caprice and passion of which an untutored and violent temper was susceptible. The impetuosity of his disposition increased with his years. The money with which he was lavishly supplied removed every obstacle to the indulgence of his wild desires. Every instance of opposition or resistance roused him to acts of fury. He assaulted his adversary with the audacity of a savage; sought to reign by force, and was perpetually embroiled in disputes and quarrels. If a dog, a horse, or any other animal offended him, he instantly put it to death. If ever he went to a fête or any other public meeting, he was sure to excite such tumults and quarrels as terminated in actual pugilistic rencontres, and he generally left the scene with a bloody nose. This wayward youth, however, when unmoved by passions, possessed a perfectly sound judgment. When he became of age, he succeeded to the possession of an extensive domain. He proved himself fully competent to the management of his estate, as well as to the discharge of his relative duties, and he even distinguished himself by acts of beneficence and compassion. Wounds, law-suits, and pecuniary compensations were generally the consequences of his unhappy propensity to quarrel. But an act of notoriety put an end to his career of violence. Enraged with a woman who had used offensive language to him, he precipitated her into a well. Prosecution was commenced against him, and on the deposition of a great many witnesses, who gave evidence to his furious deportment, he was condemned to perpetual confinement in the Bicêtrice."

The morbid and irregular excitement of the active propensities, and the total want of self-control, which are so conspicuous in moral insanity, display themselves in various ways. Almost every passion or feeling of the mind gives in different cases the character to the disease when displayed under a certain modification, which it would not be easy to describe in accurate terms. Violent gusts of passion breaking out without cause, and leading to the danger or actual commission of serious injury to surrounding persons, are the features of disease in most of the cases mentioned by Pinel. These were examples of madness, consisting in intense irascibility without lesion of the understanding. There are other instances in which malignity has a deeper die. The individual, as if actually possessed by the demon of evil, is continually indulging enmity and plotting mischief, and even murder, against some unfortunate victim of his malice. When this is connected with the false belief of some personal injury actually sustained, the case does not fall under the head of moral insanity, simply so termed. It involves hallucination or erroneous conviction of the understanding. But when the morbid phenomena include merely the expressions of intense malevolence, excited without ground or provocation, actual or supposed, the case is strictly one of moral madness. And such instances are more frequent than it will be easy for many persons to believe.

Some maniacs display their condition by a propensity to commit every species of mischief, though devoid of any feeling of malevolence A case of this description, strongly marked, was lately pointed out to the writer of this article in the York Lunatic Asylum, by Dr. Wake, the able and intelligent physician to that institution. The individual is a youth of good temper, cheerful and active, having no defect of intellect whatever that could be discovered, even after long observation. He is continually prone to commit every kind of mischief in his power; and not long ago escaped from his confinement and made his way to Bishop-Thorpe Palace, with the design to set it on fire. Dr. Wake has given his assurance that several cases have occurred precisely similar to that above related in all essential symptoms, during his attendance at the asylum, which has continued seventeen years, and that he considers no point in the history of madness better established by facts than the existence of moral insanity, strictly and exclusively so termed, and in conformity with the definition above laid down.

A large number of cases falling into this division of diseases, are those in which a disposition to melancholy and dejection of mind exists, without any illusion of the understanding connected with it. A constant feeling of gloom and sadness clouds all the prospects of life: the individual, though surrounded with all the comforts of existence, and even, exclusively of his disease, suffering under no internal source of disquiet, at peace with himself, with his own conscience, with his God, yet becomes sorrowful and desponding. All things, present and future, are to his view involved in dreary and hopeless gloom. This tendency to morbid sorrow and melancholy, as it does not destroy the understanding, is often subject to control when it first arises, and probably receives a peculiar character from the previous mental state of the individual, from his education, and his religious or irreligious character. Persons of well-regulated minds, when thus affected, express grief and distress at the inaptitude of which they are conscious to go through the active duties of life: frequently they feel a horror of being driven to commit an act of suicide or some other dreadful crime. This idea haunts them, and renders them fearful of being a moment alone. It, however, subsides, and such cases often terminate in recovery. Persons of an opposite character give themselves up to *tædium vitæ*, to morose disgust; they loathe their very existence, and at length, unless prevented, put an end to it.

A propensity to theft is often a feature of moral insanity, and sometimes it is the leading if not the sole characteristic of the disease. The writer of this article has lately seen a lunatic, confined in an asylum, who would only eat when he had stolen food, and his keeper made it a constant practice to put into some corner within his reach various articles destined for his sustenance, in order that he might discover and take them furtively. Many instances are upon record of individuals noted for a propensity to steal, without the desire of subsequent possession, though in other respects of sound mind, or at least not generally looked upon as deranged. Probably some of these would afford, if accurately scrutinized, examples of moral insanity, whilst others might be found referable to eccentricity of character

The discrimination—if indeed the two things are essentially different—could only be made in particular instances by taking into the account a variety of circumstances, such as the hereditary history of the individual and his consanguinity with persons decidedly insane, his former character and habits, and the inquiry whether he has undergone a change in these respects at some particular period of his life.

This form of insanity has been, if we are not mistaken, in many instances the real source of moral phenomena of an anomalous and unusual kind, and of certain perversions of natural inclination which excite the greatest disgust and even abhorrence.

In some instances moral insanity displays itself in a want of self-government, in a continual excitement, and unusual expression of feeling, or in thoughtless and extravagant conduct. A female, modest and circumspect, becomes violent and abrupt in her manners, loquacious, impetuous, talks loudly and abusively against her relations and guardians, before perfect strangers. Sometimes she uses indecent expressions, and betrays without reserve unbecoming feelings and trains of thought. Not unfrequently persons affected with this form of disease become drunkards; they have an uncontrollable desire for intoxicating liquors, and a debauch is followed by a period of raving madness, during which it becomes absolutely necessary to keep them in confinement. Individuals are occasionally seen in lunatic asylums who under such circumstances have been placed under control. After the raving fit has passed off, they demand their release; and when they obtain it, at the first opportunity resort to their former excesses, though perfectly aware of the consequences which await them.

A form of mental disease has been described by some writers, which, though not of frequent occurrence, is occasionally seen, and is well known to those who have extensive means of observation. It is peculiar to old age, and has been termed *delirium senile*, and by Dr. Burrows, who has accurately distinguished it, senile insanity. It constitutes a variety of moral insanity.

This disordered state makes its appearance in old men who have never before been insane or suspected of any tendency to mental derangement. It consists, like other forms of moral insanity, in a morbid excitement of passions and a remarkable perversion of the temper and propensities. The whole moral character of the person is changed. "The pious," says Dr. Burrows, "become impious, the content and happy discontented and miserable, the prudent and economical imprudent and ridiculously profuse, the liberal penurious, the sober drunken." In some elderly persons, impulses which had long been effete become of a sudden excited, and a strong tendency to vicious habits is displayed. "In fact, the reverence which age and the conduct suited to it always command, is converted into shame and pity at the perversion of those moral and social qualities which, perhaps, have hitherto adorned the patient's declining days." This description coincides accurately with the character of moral insanity. There are instances, though rare, of the appearance of hallucinative madness in old persons, but the case we have now described is of a different character, and consists in a disordered condition of the moral or active powers alone.

The following cases will afford some observations illustrative of the history of moral insanity.

J. K—, a farmer, several of whose relatives had been the subjects of mental derangement, was a man of sober and domestic habits, and frugal and steady in his conduct, until about his forty-fifth year, when his disposition appeared to have become suddenly changed in a manner which excited the surprise of his friends and neighbours, and occasional grief and vexation in his family. He became wild, excitable, thoughtless, full of schemes and absurd projects. He would set out and make long journeys into distant parts of the country to purchase cattle and farming-stock, of which he had no means of disposing; he bought a number of carriages, hired an expensive house ready furnished, which had been inhabited by a person much above his rank, and was unsuitable to his condition; he was irascible and impetuous, quarrelled with his neighbours, and committed an assault upon the clergyman of the parish, for which he was indicted and bound to take his trial. At length his wife became convinced that he was mad, and made application for his confinement in a lunatic asylum, which was consequently effected. The medical practitioners who examined him were convinced of his insanity by comparing his late wild habits and unaccountable conduct with the former tenor of his life, taking into consideration the tendency to disease which was known to prevail in his family. The change in his character alone had produced a full conviction of his madness in his friends and relatives. When questioned as to the motives which had induced him to some of his late proceedings, he gave clear and distinct replies, and assigned with great ingenuity some plausible reason for almost every part of his conduct. After a period of time passed in great seclusion, his mind became gradually tranquillized; the morbid excitement of his temper and feelings disappeared; he was set at liberty, and has since conducted himself with propriety.

A brother of the above patient has been at two different times confined in the same asylum, labouring under symptoms of derangement in all essential particulars resembling those above detailed. His disorder has consisted chiefly in morbid excitement, wildness and irregularity of conduct, differing from his usual habits and character, without any hallucination or disturbance of the intellectual faculties. He has on both occasions remained in the asylum until he was fully convalescent, and after his departure has acknowledged his conviction that he had been deranged, and in a state requiring control and seclusion from society.

Abraham B——, a working tradesman, of industrious habits, conducted himself with propriety until about forty-six years of age, and had accumulated a considerable property from the fruits of his exertions. About that period he lost his wife, and after her death became more and more penurious. At length he denied himself the comforts, and in a great measure even the necessaries of life, and became half-starved and diseased his

body was emaciated and beset with scaly eruptions. Mr. S——, a gentleman who had long known him, hearing of the condition into which he had sunk, sent a medical practitioner to visit him, by whose advice B—— was removed from a miserable dirty lodging to a lunatic asylum. Mr. S——, who was present on the occasion, observed that Abraham B——, previously to his quitting the room in which he had immured himself, kept his eyes fixed on an old trunk in the corner of the apartment. This was afterwards emptied of its contents, and in it were found, in the midst of various articles, dirty bank-notes, which had been thrown into it apparently at different times, to the value of more than a thousand pounds. Abraham B——, after his removal to an asylum, where he had wholesome food and exercise, soon began to recover from his bodily infirmities, and at length became anxious to be at large. The writer of this article visited him, and conversed with him for some time, in order to ascertain his mental condition. He betrayed no sign of intellectual delusion, nor did it appear that any thing of that description had ever been a part of his complaint. His replies to questions were rational according to the extent of his natural capacity. He was determined to go and manage his property, and get a wife who should take care of him. In a few days after his release he was married to a servant belonging to the lunatic asylum where he had been confined. His new wife found after some months that it was impossible to endure the strange conduct of her husband, and after trying various experiments, brought him back to the asylum, with a certificate from a medical man, who had examined him and declared him to be insane. He still remains in confinement, and his derangement is now more complete than formerly, as it plainly involves his intellect. He now raves against his wife, declares that she is married to her own brother, vows bitter revenge for the injuries he has sustained, and vehemently demands his release whenever he is visited by the inspecting magistrates.

Abraham B——'s case was at first merely a perversion of moral habits. If the real nature of this case was otherwise in any degree doubtful, it is rendered obvious by the more decided madness which has since appeared. Very clear indications of a disturbed intellect appeared in his manners and expressions soon after the commencement of his second confinement.

It is probable that many instances of extreme avarice and penury, as those of Elwes and Dancer, and other celebrated misers, were in reality cases of disease. Whether such individuals were proper objects for confinement is quite another question. In the case of Abraham B—— the interference of others was necessary in order to preserve his existence.

The cases above detailed resemble each other in many particulars, and especially in the circumstance that the morbid perversion of habits which characterized each of them took its rise without any cause that could be distinctly traced. In the following instance the appearance of analogous derangement was preceded and probably caused by constitutional disease, and by the suppression of a long-continued and habitual discharge from the lungs.

The case we are about to relate is a tolerably characteristic example of moral insanity. During one period of its course, when aggravated by temporary circumstances, it indicated some tendency to assume the form of monomania. The patient displayed a proneness to suspicion, and to entertain unfounded impressions connected with the motives and characters of individuals. But these impressions never became deeply fixed or took a permanent hold of the mind, and they soon disappeared. For some years both previously and subsequently to the period alluded to, the complaint wore that appearance which has, we trust, been correctly designated under the term prefixed to the present section.

The account of this case is but slightly abridged from a narrative drawn up by a near relative of the patient.

A. M—— is a maiden lady, aged about 48, of short stature, and somewhat deformed; her natural disposition was steady and industrious. She accomplished her undertakings by dint of application rather than by energetic or sudden efforts. She was constant rather than ardent in her attachments, free from resentment, never the subject of lively emotions; a great respecter of truth, just and very exact in all that she said or did. Her charitable acts were commensurate with her means, deliberate, and the result of principle rather than arising from the mere impulse of compassionate feeling. She was cautious and reserved in her communications, and scarcely if ever formed any familiar and particular intimacies with young persons of her own sex. Being debarred by her infirmities from associating with the young and active, she seemed more like an adult member of the family than a child. She was very clever in arithmetic and in all matters of business, and was fond of regulating and controlling the little affairs of those who formed the domestic circle surrounding her. Young persons and servants, finding that they derived advantage from her advice, generally gave her an opportunity of gratifying her inclination. Her dress, which was always plain and in good taste, was to her an object of greater attention than it often is to persons of fashion.

In March 1822 she was attacked by severe inflammation in the lungs, attended by expectoration of bloody mucus. This was the first time in her life when it was necessary to confine her to bed. She submitted with great reluctance to the restrictions that were needful for her recovery, and would not be persuaded until she had heard the opinion of an old friend of her family, who is a medical practitioner, that the means adopted were proper and required by her case. She was then, however, in a great measure reconciled, and after seven or eight weeks was so far recovered as to bear a removal into her native county. At this period nobody believed that she would survive another winter. Her restoration to her usual state of health was very slow, and her sister, who was her constant companion, perceived with sorrow that her temper was now much changed. She appeared restless, always wishing to go somewhere, or to do something to which she was unequal; becoming unjustly irritated when she could not urge her sister, whose health and spirits were

declining, to fall in with her ideas, and occasionally giving way to reproaches which were keenly felt. She tried every method of persuasion to induce her sister to go to the neighbourhood of London, though for the preservation of her life the latter had been obliged to give up the custom of spending the winter there, and the attempt was considered dangerous to her. Every inducement, every argument was suggested to promote this favourite object: other towns were too warm and too cold, too hilly, too much intersected with water, too *foggy*. In 1827 she determined to go without her sister to H———, near London. She went, and from her letters her sister perceived that she was living in a state of excitement far surpassing that of her former habits; paying short visits to friends in the surrounding villages, going out in the common short stages, without so much regard to weather as was usual to her even in the summer; receiving small parties at home, attending a very crowded church, writing a great many letters, &c. &c. She used to write to her sister in rather a boastful style, frequently mentioning her good health and high spirits, as if to justify her choice of a residence near the metropolis. When the sisters met during the summer at their house in ——shire, her high spirits were gone, she looked more aged than the time elapsed would have led any one to expect, took less interest in her garden, appeared exhausted, and, without contributing her share to the conversation, used frequently to sleep in her chair. She lay much in bed, nursed herself up, and in October went again to H——, as much agog as ever. Another winter passed much as the preceding one had done. She spoke much again of her high spirits, visited much, was observed to be unusually liberal in her presents to most of her acquaintances. A second summer of inertness was succeeded by a winter at H——. She was now weak, indisposed for visiting, and, in fact, so much worse as to be unable to follow her inclinations. In the spring of 1830 she had an attack of the same nature as that in 1822, but not so severe or lasting. In the summer she was nearly as before, and quite as eager to resume her plans, as enthusiastic in her commendations of every body and every thing at H——.

About this time some riots took place in London, and more were apprehended. She now expressed herself as apprehensive that "very awful times were at hand," wrote frequent letters to her sister full of indecision, and expressive of distrust in her servants, her host and his family. A friend who called upon her "was shocked to find her in so low a way." He thought her unfit to be alone, and she was unwilling to adopt any plan for leaving her lodgings, or having any one with her. She said she should be happy with her sister, and knew that she should be taken care of by the latter, but dreaded becoming a burden to her and making her ill; yet feared that if she did not go to her sister, "some one would put her where no one would know, and cause her to sign papers which she ought not to sign." She was evidently apprehensive of being sent to a lunatic asylum. She thought her host was a writer of "*Swing letters*,"* and dreaded that he might fill the house with combustibles, and blow it up with her in it. A medical man who was taken to see her, said that she was in a state of great mental excitement, and ought to be taken to her sister as soon as possible. The frost was severe when she was escorted to her sister, who was then settled at Bristol, yet she took no cold, experienced no injury from fatigue, and lost that feeling of terror to which she had for some time been subject. Since she has been with her sister, she has been increasingly obstinate, suspicious, undecided, restless, parsimonious even to meanness, indisposed to any employment, bodily or mental, except as far as relates to a most troublesome interference with the most minute actions of others. Could she have her own way, she would control the food, dress, and employment of every one near her. She has become negligent in dress, and comparatively dirty in her habits, yet has an insatiable desire for new clothes, which she never finds the right time to wear. She is constantly predicting her utter ruin, is sure she will not have money enough to live until such and such a time; knows that enough will not be found to pay Dr. ——; knows he will not let any one of so shabby an appearance be long in his house; does not know where she shall go when he is tired of her; thinks that "it is the devil that makes her behave as she does;" "that her heart is hardened to do what she ought not to do;" "she is like the man spoken of in the Gospel, who could not be bound even with fetters." She sees people look at her; hopes they don't think she drinks too much; is quite sure she never did. These impressions are continually varying; but no sooner is her mind tranquillized on one subject than another source of disquietude arises, so that she exhausts every person who is long with her. Her bodily health is better than it was for years previous to her mental derangement. A constitutional asthma, to which she has been subject from the age of six or seven years, has nearly subsided, and the habitual profuse expectoration has considerably diminished. She wears less clothing, and appears less sensible to cold or damp than heretofore.

The writer of this article has had several interviews with the subject of the foregoing relation, during some of which she gave replies to a variety of questions referring to the past and actual state of her health, both bodily and mental. No impression could be traced in her mind that bore the character of maniacal hallucination. The circumstance most observable in her condition was a perpetual disposition to find fault with every action, even the most trivial, that was witnessed by her. When asked if she was not aware of this propensity, she seemed to give an unwilling affirmative to the question, and she was plainly aware of the fact, for on the inquiry being made whether the habit had only existed of late years, or had been a part of her natural character, she steadily averred that such was not her natural disposition, "that she was formerly very different."

The preceding cases present no great difficulty as to the conclusion to be adopted respecting the nature of the disorder; such, at least, was the

* It may hereafter require to be explained that, about the period above mentioned, the threatening letters of incendiaries in various parts of the country frequently bore the signature of *Swing*.

opinion of all the medical practitioners who examined personally the individuals. We now proceed to mention an instance of moral peculiarity which will not allow of so decided an opinion.

Miss A. N—— is a maiden lady of very singular aspect and manners. She has for many years estranged herself from nearly all the friends of her family, formerly a large circle, and associates almost exclusively with her domestics, and one relative who lives with her. Her chief amusement and delight is to invent and relate the most unfounded, and sometimes the most absurd and ridiculous stories. Sometimes she has displayed mortification when in danger of being detected in the invention of these falsehoods, or when questioned respecting them. Her expression of countenance is sometimes very wild and peculiar. She has never shown any decided mark of mental derangement, nor is she considered as insane, though it has frequently been observed by those who have known her, "that they should not at any time be surprised to hear of her being mad."

No person would venture to pronounce this lady to be insane, or at least to found any proceeding upon the opinion; and yet it is highly probable that her eccentricity depends upon constitutional peculiarity. One of her parents was decidedly insane during a considerable period of life, and the other, as well as several ancestors and relations by blood, laboured under diseases of the brain, of which fatuity in different degrees was the result.

It is generally admitted that there are few questions which physicians are called upon to decide, of more difficult determination than that which relates to the existence or non-existence of insanity in examples which present no obvious and clearly discoverable disturbance in the state of the intellectual faculties. It may be apprehended that the perplexities with which this subject has been environed, will rather be increased than diminished by the recognition of a form of mental derangement admitting the designation here adopted. But the real facts of a difficult question must be known and described in their true relations, before a solution can be sought with any prospect of advantage; and if we are not mistaken in the view of this subject and the facts connected with it, which we have adopted, it will be found that something is gained by admitting a position which places the inquiry relative to the existence of insanity in a different light from that in which it has most frequently been regarded.

Those who are interested in studying the relations of this disease will do well to consult the able and well-known work of Dr. Conolly. The question how far persons labouring under merely moral insanity are incapacitated for sustaining the relations of society, belongs to medical jurisprudence.

3. *Second Form of Insanity. Madness attended with Hallucination.*—We now proceed to varieties of disease which are of far more easy discrimination than that species of madness which involves merely a perversion of the moral affections and habits. When the patient is found to labour under a disturbed condition of the understanding, when a morbid delusion or hallucination is impressed upon his mind, no doubt can be entertained as to the actual existence of insanity. By the term *hallucination* we mean to express what Cullen and Pinel denote by that of delirium, viz. a belief of unreal events or relations, apprehended under the influence of disease to be actual and real, or some notion repugnant to common sense, impressed upon the mind as true and indisputable, the patient acting under the influence of his erroneous conviction.

There are two very different states of disease attended with this symptom. In one the understanding is, when exercised on many subjects, comparatively clear, and the morbid impressions are partial; in the other, the disturbed condition of the intellectual faculties involves all the operations of the mind. These states are respectively termed monomania, and mania or ordinary mania. Each of them requires a separate consideration.

Of Monomania.—Cases of partial insanity have been by former writers distinguished by the term melancholia, and it has been supposed that a majority of them are of the description by which that term was suggested, involving gloomy impressions and dejection of mind: the designation of mania has been at the same time applied to raving madness, or insanity accompanied by violent excitement. This distinction is laid down in the most explicit terms by Van Swieten. "A maniâ distinguiter melancholia, quod nondum adsit sævus ille furor, qui in maniacis observatur. Præterea et illud signum diagnosticum melancholiæ est, quod uni et eidem cogitationi pertinacissime inhæreant tales ægri, et fere circa hanc illamve opinionem delirant tantum; in reliquis omnibus sanam ostendunt mentem et sæpe acutissimum ingenium." It was well observed by M. Esquirol, that the distinction connected with this appropriation of terms is not uniformly supported by facts, as the impressions of partial madness are not always of a gloomy character: the mind, in this form of disease, is not in every instance abandoned to sorrow and melancholy. The term monomania, meaning madness affecting one train of thought, or involving only a single morbid impression, was on these considerations substituted. and has generally been adopted of late times instead of melancholia.

The notion, however, which many persons entertain as to the nature of the disease thus designated, is very far from being in general correct. It is supposed that the mind is perfectly sound when its faculties are exercised on any subject unconnected with a particular impression which constitutes the entire disease. Cases are on record which, if faithfully recorded, fully come up to this description. In general the real character of monomania is very different. The feelings and affections are in that state which has been described under the head of moral insanity, and on this it would appear that some hallucination or maniacal delusion has supervened. The following case will serve to illustrate the observation which we have just made.

Mr. E. W——, a gentleman about thirty years of age, has laboured for several years under symptoms of moral insanity. He has been long dejected in spirits and morose in temper, dissatisfied with himself, and suspicious of all that surrounded him. He was capricious and unsteady in his pursuits, frequently engaging in some new study

in the most sanguine manner and soon abandoning it in despair of making any progress, though possessed of good talents and considerable acquirements of knowledge. He passed the requisite period of time at one of the Universities, but could not be prevailed upon to go in for his degree, either through timidity and want of resolution, or, as it was conjectured by his friends, from a morbid apprehension that the examiners would not deal fairly with him and award him the station to which he aspired and believed himself entitled. He applied himself afterwards to the study of medicine, and then to that of metaphysics, and speedily relinquished both. He frequently changed his residence, but soon began to fancy himself the object of dislike to every person in the house of which he became the inmate. His peculiarities appearing to increase, he was visited by two physicians, who were desired to investigate the nature of his case. On being questioned narrowly as to the ground of the persuasion expressed by him, that he was disliked by the family with which he then resided, he replied that he heard whispers uttered in distant apartments of the house indicative of malevolence and abhorrence. An observation was made to him that it was impossible for sounds so uttered to be heard by him. He then asked if the sense of hearing could not, by some physical change in the organ, be occasionally so increased in intensity as to become capable of affording distinct perception at an unusual distance, as the eyes of mariners are well known to be accommodated by long effort to very distant vision. This was the only instance of what might be termed hallucination discovered in the case after a minute scrutiny. It seemed to be a late suggestion. The individual had been for years labouring under a gradually increasing moral insanity. His judgment had become at length perverted by the intensity of his morbid feelings, and admitted as real an erroneous impression, suggested by his fancy, which happened to be in harmony with his feelings, and served to account for them.

There are, indeed, cases of insanity attended with hallucination on a constant erroneous impression, in which this system will appear to many persons to afford but little evidence as to the real nature of the complaint. The delusive impression appears to be so blended with the prevalent disorder of the feelings and affections, or it seems to be so much the result of the peculiar circumstances by which the patient is surrounded, that it is scarcely contemplated as a distinct and peculiar phenomenon. These remarks will receive illustration from the following case.

Mr. H. P—— had been for many years confined in a lunatic asylum, when, an estate having devolved upon him by inheritance, it became necessary to subject him anew to an investigation. He was examined by several physicians, who were unanimous in the opinion that he was a lunatic; but a jury considered him to be of sound understanding, attributing his peculiarities to eccentricity, and he was consequently set at liberty.

The conduct of this individual was the most eccentric that can be imagined: he scarcely performed any action in the same manner as other men; and some of his habits, in which he obstinately persisted, were singularly filthy and disgusting. For every peculiar custom he had a quaint and often ludicrous reason to allege, which indicated a strange mixture of shrewdness and absurdity. It might have been barely possible to attribute all these peculiarities, as well as the morbid state of temper and affections, to singularity in natural character and to the peculiar circumstances under which this person had been placed. But there was one conviction deeply fixed on his mind, which, though it likewise might be explained by the circumstances of his previous history, seemed to constitute an instance of maniacal delusion. Whenever any person whom he understood to be a physician attempted to feel his pulse, he recoiled with an expression of horror, and exclaimed, "If you were to feel my pulse, you would be lord paramount over me for the rest of my life." The result has proved that confinement is not always necessary in cases of this description. Mr. H. P—— has remained at liberty for many years, and his conduct, though extremely singular, has been without injury to himself or others.

We shall conclude our observations on this subject by the record of a remarkable case which illustrates the tendency of moral insanity to degenerate into, or ultimately assume, the character of monomania. The individual who was the subject successively of these forms of disease, was for several years in a state which gave rise to apprehension in many of his friends, while some who narrowly observed him were fully convinced of his insanity. The disease at length broke out in a form which admitted of no doubt.

A gentleman remarkable for the warmth of his affections, and the amiable simplicity of his character, possessed of great intellectual capacity, strong powers of reasoning, and a lively imagination, married a lady of high mental endowments, and who was long well known in the literary world. He was devotedly attached to her, but entertained the greatest jealousy lest the world should suppose that, in consequence of her talents, she exercised an undue influence over his judgment, or dictated his compositions. He accordingly set out with a determination of never consulting her, or yielding to her influence, and was always careful, when engaged in writing, that she should be ignorant of the subject which occupied his thoughts. His wife has been often heard to lament that want of sympathy and union of mind which is so desirable in married life. This peculiarity, however, in the husband so much increased, that in after years the most trifling proposition on her part was canvassed and discussed by every kind of argument. In the meantime he acquired strange peculiarities of habits. His love of order, or placing things in what he considered order or regularity, was remarkable. He was continually putting chairs, &c. in their places; and if articles of ladies' work or books were left upon a table, he would take an opportunity *unobserved* of putting them in order, generally spreading the work smooth, and putting the other articles in rows. He would steal into rooms belonging to other persons for the purpose of arranging the various articles. So much time did he consum

in trifles, placing and replacing, and running from one room to another, that he was rarely dressed by dinner-time, and often apologised for dining in his dressing-gown, when it was well known that he had done nothing the whole morning but dress. And he would often take a walk in a winter's evening with a lanthorn, because he had not been able to get ready earlier in the day. He would run up and down the garden a certain number of times, rinsing his mouth with water, and spitting alternately on one side and then on the other, in regular succession. He employed a good deal of time in rolling up little pieces of writing-paper, which he used for cleaning his nose. In short, his peculiarities were innumerable, but he concealed them as much as possible from the observation of his wife, whom he knew to be vexed at his habits, and to whom he always behaved with the most respectful and affectionate attention, although she could not influence him in the slightest degree. He would, however, occasionally break through these habits; as on Sundays, though he rose early for the purpose, he was always ready to perform service at a chapel a mile and a half distant from his house. It was a mystery to his intimate friends when and how he prepared these services. It did not at all surprise those who were best acquainted with his peculiarities, to hear that in a short time he became notoriously insane. He fancied his wife's affections were alienated from him, continually affirming that it was quite impossible she could have any regard for a person who had rendered himself so contemptible. He committed several acts of violence, argued vehemently in favour of suicide, and was shortly afterwards found drowned in a canal near his house. It must not be omitted that this individual derived a predisposition to madness by hereditary transmission: his father had been insane.

Of Mania.—The phenomena of mania in its ordinary form are very distinguishable from those of monomania. The aspect, the voice, the gestures of the lunatic in the active state of maniacal derangement, form a contrast with the retired and morose habits of the sullen monomoniac. In cases, however, of mania, distinctly so termed, one impression often occupies the mind of the individual for the time being, and this is frequently some hallucination respecting his own person, some magnific dream of self-importance and superiority. M. Pinel says, "I was frequently followed at the Bicêtre by a general, who said that he had just been fighting an important battle, and had left fifty thousand men dead on the field. At my side was a monarch who talked of nothing but his subjects and his provinces. In another place was the prophet Mahomet in person, denouncing vengeance in the name of the Almighty. A little further was a sovereign of the universe, who could with a breath annihilate the earth. Many of them seemed to be occupied by a multiplicity of objects, which were present to their imaginations. They gesticulated, declaimed, and vociferated incessantly, without appearing to see or hear anything that passed. Others, under illusive influence, saw objects in forms and colours which they did not really possess. Under the influence of an illusion of that kind, was a maniac who mistook for a legion of devils every assemblage of people that he saw. Another maniac tore his clothes to tatters, and scattered the straw on which he lay, under the apprehension that they were heaps of twisted serpents."

Ordinary mania, or madness affecting the mind with a general disturbance of the intellectual faculties, is sometimes preceded by occasional fits of excitement and confusion, in which the understanding is hurried and disordered. But it differs from monomania in making its attacks for the most part suddenly and without any premonitory symptoms. An individual, after having undergone an unusual degree of mental and bodily exertion and fatigue, after a fit of intoxication, which in this country is one of the most ordinary of exciting causes of madness, after the excitement of violent passions or anxieties, after exposure to cold and the inclemencies of weather, passes sometimes a day or two in a state of feverish disorder and general uneasiness, and two or three restless nights. His mind is then found to be confused; he appears scarcely to know what he says, talks nonsense, repeats his words frequently, expresses his feelings with an absurd degree of warmth and enthusiasm, cries, laughs, utters rapid and confused sentences in a hurried and impetuous manner. "In the course of a few days, or sometimes at first, he is seized with violent agitations, expresses vague and continual apprehensions, is subject to fits of terror; he is in a state of constant excitement and sleeplessness; he indicates the troubled state of his mind by unusual gestures, by singular appearances of the countenance, and by actions which cannot fail to strike in a forcible manner every observer. The various aspects which the symptoms of the disease assume at this period, have never been more graphically described than by M. Pinel. "The patient sometimes keeps his head elevated and his looks fixed on high; he speaks in a low voice, or utters cries and vociferations without any apparent motive; he walks to and fro, and sometimes arrests his steps as if excited by the sentiment of admiration, or wrapt up in profound reverie. Some insane persons display wild excesses of merriment, with immoderate bursts of laughter. Sometimes, also, as if nature delighted in contrasts, gloom and taciturnity prevail, with involuntary showers of tears, or the anguish of deep sorrow, with all the external signs of acute mental suffering. In certain cases a sudden reddening of the eyes and excessive loquacity give presage of a speedy explosion of violent madness, and the urgent necessity of a strict seclusion. One lunatic, after long intervals of calmness, spoke at first with volubility, he uttered frequent shouts of laughter, and then shed a torrent of tears; experience had taught the necessity of shutting him up immediately, for his paroxysms were at such times of the greatest violence. It is often observed that extatic visions in the night are the preludes to fits of maniacal devotion; and by enchanting dreams, or by the fancied apparition of a beloved object, it sometimes happens that erotic madness breaks out with violence, when it may either assume the character of a calm reverie, or display nothing but extreme confusion in the ideas and the entire subversion of reason."

When the disease has taken a firm hold on its

unfortunate victim, it sometimes gives rise to all the internal effects, and displays all the external phenomena which the most intense feelings of human misery, resulting from the real calamities of life, may be imagined to produce. The maniac who becomes the subject of violent excitement "is seen in a state of extreme agitation, with his face flushed, his eyelids inflamed, and his eyes sparkling, his temples beating violently; he talks, cries, sings, grieves, gets into fits of rage by night and by day, and is incapable of taking rest. The melancholic, also, in extreme agitation, but wrapt up in himself, goes to seek in some quiet and dark recess a refuge from his panic terrors, from his gloomy and despairing thoughts; or the means of putting into execution his baneful designs. The insensible and stupid, incapable of anything, remain unconscious of surrounding objects, and do not even exert themselves to satisfy their most urgent wants. At this period of madness there is a constant want of sleep: the patient often experiences a feeling of tension and of heat in the head, without, however, complaining of it. Sensibility to external impressions, as well as to all bodily changes, is so much lessened, that blisters, cauteries as well as exposure to intense cold, will sometimes produce but little expression of pain or distress.

4. *Of Incoherent Madness.*—A very peculiar and well characterized form of mental derangement is that of incoherent madness, or incoherency, in which the mind is occupied by a rapid succession of unconnected thoughts and evanescent emotions, and becomes entirely incapable of reflection, or even of distinct apprehension. Such cases are frequent, and are to be met with in every receptacle containing a considerable number of lunatics. Incoherent madness, or incoherency, is the most proper designation for this state of disease, as it describes the essential and characteristic feature. By Pinel the term *démence*, or dementia, has been adopted; and to this there would be no objection if it were not for the circumstance that the same term has been used by Esquirol and Georget with a different meaning, and that confusion would hence arise from an ambiguous designation. Under the term *démence*, the writers last mentioned describe that state approaching to fatuity or idiotism, which is the termination of protracted insanity, and in this sense the word is now commonly received. Since this is a morbid condition very distinguishable from that incoherency which is a primary and idiopathic form of mental derangement, each of these states of disease must have a particular epithet.

This form of madness is in some instances a primary affection; at least the tendency to incoherency displays itself very early in the progress of the case. The disease commences with great excitement; the patient is restless and unusually active; his manners are full of bustle and violence; his countenance flushed; he has sleepless nights; his thoughts follow each other with turbid rapidity; and his whole appearance strongly resembles that of a man of excitable temperament intoxicated with wine or spirituous liquors. In many cases there is no hallucination or erroneous impression on the mind that can be traced, but the violent and irrational activity of the patient is such as to require coercion. The succession of confused and imperfect ideas becomes after a time so rapid as to preclude distinct utterance. The association which connects images in the mind seems to be lost, or at least cannot be traced, and the thoughts appear to be single and insulated. Words and sentences are half pronounced; the voluntary movements are without design, and the effort to perform them is incomplete; it is impossible to fix the attention of the patient sufficiently for obtaining a reply to the shortest question; he becomes almost insensible to the existence of external objects, talks incessantly, or repeats the same word or half sentence over to himself; he takes his food, when it is offered to him, by hasty snatches, and swallows it greedily, or spits it out again in order to continue his unmeaning jargon. After this state of excitement has continued for some time, it gradually subsides, and the discase either continues with mitigated violence, but still with the same form of incoherency and want of connection in the course of thoughts and feelings, or the expressions gradually appear to be more connected, the patient becomes capable of sleep, and a slow progress towards the restoration of the reasoning faculty is perceptible. The writer of the present article has witnessed several instances of complete recovery of the mental powers after the existence, during many weeks and even months, of maniacal phenomena answering to the above description; and every physician who has had opportunities of inspecting lunatic asylums must have observed many cases in which the state of incoherency has terminated in recovery, and others in which it has become chronic and permanent.

The following case described by Pinel is a well marked instance of the morbid state now under consideration, and it will be sufficient to prove that the affection termed by that writer *démence* is precisely what we have designated as incoherent madness.

"An ardent but ill-informed patriot, and one of the warmest partisans of the celebrated Danton, was present at the sitting of the legislative body, when the writ of accusation was pronounced against that deputy. He withdrew in consternation and despair, shut himself up in his own apartment for several days, and surrendered himself to the influence of the most gloomy ideas. 'What! Danton a traitor!' he repeated without ceasing; 'then is there no man to be trusted; the republic is lost!' His appetite and sleep forsook him. Complete insanity ensued. Having undergone the usual treatment at the ci-devant Hôtel Dieu, he was removed to the Bicêtre. He passed several months in the infirmary of this hospital in a state of tranquil reverie, uttering incessantly half-expressed and unconnected sentences. He talked alternately of daggers, sabres, dismasted vessels, green meadows, his wife, his hat. He never thought of eating but when food was actually put into his mouth; and in respect to his functions he was almost levelled with an automaton."

The chronic form of incoherence presents similar phenomena, but in a milder degree. Patients in this last state have intervals of rest; they sleep, and have periods of tranquillity during their waking hours, but seldom or never display coherence and arrangement in their ideas, or make any approach towards a sane and vigorous use

of the reasoning powers. Neither have they any appearance of melancholy or abstraction, but they are capable of being momentarily excited by objects which impress their senses and by the scenes around them, though their impressions are transitory and evanescent. They talk to themselves or to others for a long time in phrases scarcely connected by any perceptible link, and in which there is rarely a glimpse of meaning; and if any association can be traced in their thoughts, it is of the most trivial kind, and depending on a word or some sensible object which for a moment attracts their attention. They will sometimes repeat the same word or half sentence many times, but soon forget it.

The disease which we have now described under the designation of incoherent insanity has been by some writers identified with dementia, or the first stage of fatuity. It is, however, a particular form of mental disease, assuming its peculiar character from the first, and displaying phenomena very different from those of dementia, though, like other forms of madness, it is liable, when long protracted, to pass eventually into fatuity. The writer of this article has seen in private practice and in hospitals several well-marked cases of incoherent madness in the acute form, which ran their course and terminated in recovery without passing into the chronic stage. Of the chronic form, which approaches most nearly to dementia, but may yet be distinguished from that state of disease in its ordinary appearances, some illustrative cases have been pointed out to him in the Lunatic Asylum at Fishponds, near Bristol, by Dr. Bompas, the humane and intelligent conductor of that establishment. Two of these occur in brothers, whose symptoms are very similar, though those of one are more strongly marked than of the other. Although the former of these individuals has been in confinement for many years, his countenance does not display the well-marked aspect of dementia, of which M. Esquirol has given so excellent a delineation. If questioned, he replies with an intelligent look, but in words quite beside the subject, and chatters about a hundred unconnected things in the course of a few minutes. If you repeat the question, it only increases his volubility without apparently drawing his attention a whit more nearly to the subject of inquiry.

5. *Observations on the State of the Faculties in Madness.*—It has been a question frequently agitated among medical writers, in what precise changes in the organic operations of the brain, as well as in the mental processes which result from these operations, madness consists. The present is not a suitable opportunity for entering into a full discussion of this subject. In a practical point of view, all that is requisite will be obtained by a brief inquiry into the actual condition of the intellectual faculties in insane persons.

It may be observed that consciousness generally remains unimpaired in lunatics, though its exercise, in some cases of madness with hallucination, is connected with singular phenomena. The patient is conscious of his sensations, but he sometimes expresses himself as if his notion of personal identity were strangely confused. He talks and reasons about his feelings as if they were those of another individual. These are by no means frequent cases, and in general lunatics have a distinct perception of their personal identity, and refer their sensations and ideas correctly to themselves.

Sensation likewise remains unimpaired in the insane: the organs of sense at least are not the seats of disease, nor are those processes in the nervous structure on which sensation depends in a deranged state. The sensations produced by light and sound are sometimes morbidly acute, from temporary affection of the organs of sight and hearing; but this is accidental, and by no means a circumstance characteristic of madness. The effects of cold and other painful impressions are in some instances disregarded by lunatics, but this seems to be merely a result of intense excitement of the mind and its direction to other feelings and operations. Such cases are not so frequent as they are supposed to be, and in general lunatics are sensitive of external impressions.

Perception of external objects is generally unimpaired, but in some cases it is strangely affected and perverted by the morbid impressions on the mind, and by the influence of the prevailing hallucinations.

Maniacal hallucinations are of two kinds. Dr. Cullen has remarked that "*there is sometimes a false perception* or imagination of things present that are not; but this is not a constant nor even a frequent attendant of the disease. The false judgment is of relations long before laid up in the memory." This means that the hallucination seldom refers to the scene actually present, but to the impressions of memory. When, however, the maniacal reverie becomes very intense, it produces hallucinations or false impressions which represent unreal objects as actually present. Even in this case it does not appear that perception is impaired. Some particular phantasms, the creations of reverie, are presented to the mind in colours so vivid as to produce an effect similar to that of actual perception; the patient in other respects makes no mistakes with regard to place or time; his perceptions of external objects are correct and uniform whenever his attention is directed to perceptible things; but he is so intent upon his reverie, that for the most part he totally neglects them; his fancy becomes so intense in its operation as to carry him away from the influence of his external perceptions, and to environ him with visions of unreal scenes.

We have often seen a lunatic under this form of disease walk up and down a frequented place, sufficiently alive to external objects to avoid falling in the way of horses and carriages, or running against foot-passengers, but so intent upon the scene presented by his excited imagination as to be busily employed in issuing commands to troops of which he imagined himself to be the general, and in directing them to enfilade to the right and left, and perform a variety of evolutions. All this he performed with a voice and gesture that were perfectly natural and consistent with reality. To this modification of madness belong those maniacal hallucinations termed by some writers idilomania or dæmonomania, in which the lunatic fancies that he sees and holds converse with imaginary beings. The conception of the mind is so vivid and intense that it withdraws consciousness

entirely from the sensations excited by surrounding objects, which nevertheless exist, and occasionally under particular circumstances give rise to perception. Maniacal hallucinations have, however, a much firmer hold on the belief in some cases of madness than the strongest evidence afforded by perception, and hence the futility of those projects which are occasionally suggested for surprising lunatics into a conviction of their false judgments. An insane female confined in an asylum had a firm persuasion that her husband was dead. When he came to visit her, she asserted that it was the devil who had assumed his form. Her recollection and perception had remained unimpaired, but the insane hallucinations overcame their evidence and held possession of her mind.

The power of reasoning or judgment does not appear to be so much impaired in madness as the disposition to exercise it on certain subjects. Often there is a manifest unwillingness to admit any evidence unfavourable to the false notions impressed upon the mind, while great ingenuity is displayed in finding arguments which may tend to make it apparently more reasonable. A case illustrative of this remark has been already mentioned.

In many instances of madness it would appear that the characteristic feature of the disease is a morbid inclination to indulge in reverie, and to yield the judgment and all the faculties to its control. The impressions of reverie are so modified by disease as no longer to be distinguishable from those of memory or active reflection. We may venture to say that this observation will go far towards explaining the mental phenomena of the disease.

6. *Disorders in the state of the physical functions attendant upon madness.*—The phenomena of madness which attract most observation, and which indeed characterize the disease, are those which depend upon the disordered state of the cerebral functions; but other processes in the living body are likewise in a state of derangement. There is in most cases of insanity, besides the morbid condition of the brain and nervous system, more or less of disturbance in the physical functions; the secretions, excretions, appetite, and digestive processes are frequently disordered. Medical writers have differed in opinion as to the relation which these affections bear to the cause of insanity.—Pinel has stated it to be the result of his inquiries that the primary seat of mental alienation is generally in the region of the stomach and intestines, and that from that centre it propagates itself, as it were, by irradiation, and deranges the understanding. Others have looked upon the disorders in the functions of the viscera as merely contingent results of a primary disease, seated in or immediately affecting the brain.

Whichever of these opinions may be correct, the general, or at least the frequent co-existence of disorder in the physical functions with that affection of the brain from which the deranged state of the mind immediately results is an indisputable fact.

The physical functions are differently affected in different forms of madness. In disorders of slow and gradual accession, and especially in those cases in which the mind is melancholy and depressed, a torpid state of the vital and natural functions for the most part prevails; the circulation is languid; the pulse weak and generally slow; the extremities cold; the skin cold and clammy; most of the secretions are defective; the bowels are torpid and sometimes obstinately constipated and flatulent, requiring strong doses of aperient medicine. The appetite is defective; digestion is impaired; sometimes there is a constant loathing of food, which, if the patient were not obliged to eat, would induce him to starve himself, and it is often extremely difficult to persuade persons in this state to swallow nutriment sufficient for the preservation of life. Emaciation and loss of strength inevitably result from these circumstances, but they are sometimes not so striking as any person would anticipate.

Attacks of maniacal disease, which break out suddenly with great excitement of the passions, with general disturbance of the intellectual faculties, or with incoherence, are almost always accompanied by symptoms of fever or pyrexia more or less acute. The pulse is rapid, often full, and beating with disproportioned strength in the carotid and temporal arteries; the skin is hot and the tongue white; there is thirst, with loss of appetite, headach, sleeplessness, and great irritability; the secretions are deficient, the urine is high-coloured and scanty, and the bowels are constipated. The face is often flushed; the eyes are glossy and suffused; the conjunctiva is injected with blood, and the pupils are contracted. The patient sometimes complains of pain in the forehead and temples, with a sense of weight upon the head, or of constriction, as if the scalp were tightly drawn. It has been observed that in some instances persons who had previously suffered severely from headach have ceased to complain of it when madness has supervened, and that it has returned when such patients have become convalescent. Want of rest is often a troublesome and distressing symptom. Many patients pass whole nights without closing their eyes, or when they obtain sleep, it is short and agitated. In other instances a few hours of sound sleep are the prelude to a paroxysm of renewed excitement, the maniacal symptoms breaking out on waking with increased violence.

All the symptoms which refer themselves in a perceptible manner to the head are liable to undergo occasional exacerbations during the continuance of madness. Increased heat of the scalp, redness of the eyes, fulness and strong pulsation of the carotid and temporal arteries, want of sleep and consequent irritability of the temper and feelings, indicate and precede or accompany renewed periods of violence in the symptoms of mental derangement.

In many instances of maniacal disease there is much disturbance in the functions of the intestinal canal. This observation has been made more particularly in persons whose general health has been previously much neglected; in the inmates of some lunatic asylums; in individuals of the lower class, who have been subjected to hardships and unwholesome diet, as well as to cold and a

damp unwholesome atmosphere; in cases in which the disease has followed excesses of various kinds, or confinement on ship-board, with the use of salt provisions. In many instances of this description it has been found that the bowels had been long in a confined and torpid state. In those instances in which it is stated that the bowels are open and even more loose than natural, it often appears on further examination that a long-continued torpor and constipation have given way to diarrhœa; the abdomen, which had previously been swelled with indurated matter, has become more distended than before, flatulence being added to the load of solid contents but partially discharged. The evacuations are thin and watery, or contain mucus mixed with vitiated bile and recent aliment in an undigested state. Sharp and transient pains are experienced in various parts of the abdomen, which is often tender on pressure; at length, in very neglected cases, dysentery supervenes and brings on extreme emaciation. The tongue is often red or covered with a brown fur, and the mouth and fauces with a viscid mucus, which, together with saliva, the patient spits out in all directions. There is great thirst and a peculiar fetor of the breath, which extends to the whole person. The appetite is depraved; in many cases the patient has an aversion to all food; in other instances he has a keen and voracious desire for it, and greedily devours without selection every thing eatable that falls in his way. The skin is cold; there is a remarkable coldness of the extremities, resulting from the damp state of the skin and a want of energy in the circulation through the extreme vessels. In some cases of long duration, there are papular or scaly eruptions; and in exhausted and debilitated subjects, furunculi appear in various parts of the body which are much disposed to slough.

[See an interesting case, by Dr. Prichard, of the connection of insanity with tuberculous formations and ulceration in the intestinal canal, in *Provinc. Med. Journal*, Jan. 27th, 1844, or in *Amer. Journal of the Med. Sciences*, April, 1844, p. 445.]

Cases of madness, coming on with some degree of rapidity, are often preceded and sometimes accompanied or followed by suppressions of natural or customary discharges, by the disappearance of external diseases, or the cure or suspension of internal complaints. The relation which these changes bear to madness as causes or results may be different in different cases; they are connected circumstances of that disease. The catamenia, if not suppressed previously to the manifestation of cerebral disorder, soon become scanty, or cease entirely after its actual appearance. Lochiæ and other analogous effluxes are suppressed; ulcers, which had become habitual and had long discharged, are dried up; chronic eruptions generally disappear, or are materially lessened; symptoms of pulmonary phthisis in various stages cease or become mitigated in a remarkable degree. On the decline of maniacal disease, it is often found that the return of such discharges, or the revival of suspended trains of morbid symptoms such as we have described, is the harbinger of restoration to a sound state of mind, though not to complete bodily health.

Sect. III.—Of the Duration of Insanity, and of the Modes of its Termination.

The duration of insanity is various, and admits of no general estimate. In some instances this disease has subsided in the course of a few days after its commencement; in others it continues for many years. M. Esquirol has remarked that it is not uncommon to meet with inmates of lunatic asylums who have been twenty, thirty, or even forty years in confinement. The same observations must have occurred to every person who has been in the habit of visiting such establishments.

Insanity has three different terminations:—first, in recovery; secondly, in a state of fatuity, or of chronic and permanent failure or obliteration of the mental faculties; thirdly, in death. The last is generally the contingent result of some of those disorders in the physical functions of the body to which the insane are especially liable. We shall allot a separate consideration to the circumstances connected with each of these events of insanity.

1. *Of Recoveries from Insanity.*—Recovery from madness sometimes takes place suddenly, but more frequently it is gradual, and preceded by several periods of mitigation in the intensity of disease, and often by lucid intervals.

The prospect of recovery is much greater in young persons than in those of advanced years, and it diminishes, other circumstances being equal, with the patient's age. M. Esquirol has observed that few lunatics are cured after the sixtieth year. It must, however, be taken into the account that few comparatively are for the first time attacked by madness after that period of life.

The curability of madness, or, to speak more correctly, the proportion of maniacal cases which terminate in recovery, is likewise subject to great variation from circumstances which refer to the nature of the disease, its occasional complication with other maladies, the sex and constitution of the patient, the mode of treatment to which he is subjected, and the causes which have given rise to his disorder; and hence any general calculations on this subject are matters rather of curiosity than of practical value. One remark, however, may be of use, as it may encourage medical practitioners in their efforts to remove or mitigate the disease. Of cases which present no peculiarly unfavourable combinations, a much larger proportion terminate in recovery than is generally supposed, or than any person could be led to believe from the inspection of reports from hospitals. In these reports it generally happens that a great number of inveterate cases, and of such as are incurable from their conjunction with other diseases dangerous to life, and indicating changes in the organic condition of the brain, are blended with those of simple insanity in the general averages.

M. Esquirol has endeavoured, by comparing the reports of several extensive hospitals in France and England, to throw some light on the curability of madness, or on the proportion of recoveries. The following table presents some facts which are of great interest.

TABLE OF RECOVERIES FROM MADNESS.

		Admissions.	Recoveries.
In England.			
In Bethlem Hospital	from 1748 to 1794	8874	2557
" "	in 1813	422	204
In St. Luke's	from 1751 to 1801	6458	2811
In York Asylum		599	286
In the Retreat, near York	from 1801 to 1814	163	60
	Totals	16516	5918
In France.			
Charenton	from Nov. 22, 1798 to 1800, 22 July	97	33
	1803	499	161
Salpêtrière	from 1801 to 1805	1002	407
"	from 1804 to 1813	2005	1218
"	from 1806 to 1807	531	286
"	from 1812 to 1814	891	413
In M. Esquirol's private establishment	from 1801 to 1813	335	173
	Totals	5360	2691

From the data contained in this table, M. Esquirol concludes, "first, that the absolute number of recoveries from madness is about one in three; secondly, that the number of recoveries varies from one in four to one in two, or to one-half of the number of persons affected: this difference depends upon particular circumstances of locality, on the nature of the cases, and of the treatment pursued: thirdly, that cures are more numerous in France than in England." He adds that they are much more rare in Germany and in Prussia.

A much more extensive collection of reports from various lunatic asylums, both public and private, in England, France, and other countries, has been made by Dr. Burrows, who has constructed from these materials a table exhibiting the proportion of recoveries. The evidence afforded by such collections is very much confused, and in many instances rendered wholly inconclusive from the variety which exists in the regulation of different establishments as to the nature of the cases admissible into them, and the time during which the patients admitted are kept. For instance, the hospitals of Bethlem and St. Luke impose certain exclusions elsewhere unknown. They reject all patients who have been more than twelve months insane; those affected by paralysis, however slight, and by epilepsy or convulsive fits; idiots, the aged and infirm; those discharged uncured from other hospitals: there are likewise other exclusions besides those above mentioned, and all persons who have not recovered at the expiration of one year are dismissed. Yet on comparing the reports of these hospitals with those of other institutions, the regulations of which are less favourable to a high proportion of cures, and where no selection or exclusion exists, we do not find, as Dr. Burrows remarks, the relative number of recoveries to be so great as might be expected. It is indeed surprising to find that the reports of Bethlem Hospital, of a century and a half ago, give a greater proportion of cures than those of many years preceding 1817, when an improvement took place in the arrangements of that establishment. Dr. Burrows remarks on the authority of Stow, who derived his information from Dr. Tyson, physician to Bethlem Hospital, that "from 1684 to 1703, 1294 patients were admitted, of whom 890 were cured, which is a proportion of two in three. But from 1784 to 1794, 1664 patients were admitted, of whom 574, or rather more than one in three, recovered." It is probable that there were circumstances in the former arrangements which, if they were known, would explain this difference. On the whole, the results of Dr. Burrows' inquiries are much more favourable to British hospitals than those of M. Esquirol. It appears, indeed, from his statements that the proportions of recoveries in England are greater than those obtained in France, Germany, and, *à fortiori*, in any other country in Europe. This may be in some degree judged of by comparing the following statements, taken during late years, with those previously given from M. Esquirol's collections.

In Stafford Asylum, from 1818 to 1828, admissions 1000; cured 429; or about 43 in 100.

In Lancaster County Asylum, from 1817 to 1825, admissions 812; cured 322; or about 39 in 100.

In Wakefield County Asylum for the West Riding of Yorkshire, from 1819 to 1826, admissions 917; cured 384; or about 42 in 100.

[The experience of the insane institutions of the United States has been highly encouraging. They are admirably conducted institutions; yet it is not easy to deduce from them, or from the European institutions more than an approximation to the number of cures. Annual reports are certainly not well adapted to convey very positive information as to relative curability; and this is sufficiently shown by the discrepancy amongst them;—those which publish the smallest number of cases cured being by no means the least successful. The published ratio of cures is generally, indeed, higher than it ought to be, owing to the time being too short to enable an accurate judgment to be formed, and the patients being too often withdrawn or dismissed from the institution before they were wholly restored. Dr. Pliny Earle (*Amer. Journal of the Med. Sciences*, April 1843, p. 347) has drawn up the following table, which applies, in the case of all the institutions but one, to a series of years. In the Bloomingdale Asylum, New York, many cases of delirium tremens are received, which may account for the greater proportion of recoveries among males;—as a general rule, the greater number of restorations appearing to occur in the other sex.

ASYLUMS.	TIME.	MEN.			WOMEN.		
		Admitted.	Cured.	Per Cent.	Admitted.	Cured.	Per Cent.
Hanwell	1831 to 1840	1013	223	20.01	1016	226	22.24
Pennsylvania Hospital	1841	103	15	14.56	73	15	20.54
Bloomingdale	1821 to 1841	1692	848	50.12	906	352	38.91
Massachusetts State Hospital	1833 to 1841	680	365	53.67	637	392	61.53
Total		3488	1451	35.09	2632	985	35.80

(See, also, Dr. Woodward, in Eleventh *Annual Report of the State Lunatic Asylum, at Worcester, Mass.*, p. 39, Boston, 1844.)]

From these statements it clearly appears that M. Esquirol's computation of recoveries is much below what really takes place under favourable circumstances. The results are so different under different circumstances, that no general average can be of much value in a practical point of view.

Another inquiry, which admits of a more satisfactory elucidation, and which leads to results very interesting in their relation to prognosis, refers to the period of the disease during which recovery is chiefly to be expected. Some facts, tending to illustrate this question, were contained in a memoir presented by M. Pinel to the French Institute in 1800. It appeared from this memoir that the greatest number of recoveries from madness take place in the first month of its duration, the recoveries during the first being compared with those of succeeding months. The mean time for the duration of the disease, in cases terminating favourably, was fixed in the same document at from five to six months. This result was deduced from a selection of cases from which the author excluded all those which had been under previous treatment, as well as cases of long duration. A longer term is assigned to this disease, in cases terminating in recovery, by Mr. Tuke in his account of the Retreat at York; and M. Esquirol, whose accuracy of research in subjects of this nature gives to his authority the highest value, confirms the opinion of Mr. Tuke. He has drawn this conclusion from a statement of the cases admitted into the Salpêtrière during ten years, as shown by the following table.

TABLE OF RECOVERIES AT THE SALPÊTRIÈRE DURING TEN YEARS.

Admissions.	1804.	1805.	1806.	1807.	1808.	1809.	1810.	1811.	1812.	1813.	1814.	Totals of Cures.
209	64	47	7	4	3	2		1	1			129
212	73	54	4	2	2	1				1		137
206	78	49	10	3	1	1	1					143
204	60	55	11	1		2						129
188	64	57	4	2	1					2		130
209	48	64	9	4	1	3						129
190	48	51	7	1	3							110
163	44	30	8	3								85
208	75	41	11									127
216	50	49										99
2005												1218

It seems that the report on which this table was founded, extended from the year 1804 to 1813; 2804 female lunatics were admitted during this interval, of whom 795 were considered as incurable, on account of their advanced age, or because they were idiotic, epileptic, or paralytic subjects. The remaining 2005 were put under treatment without regard to the duration or peculiar character of their disease. Out of this number, 604 were cured during the first year, 497 in the second, 86 in the third, and 41 in the seven succeeding years. From these data M. Esquirol draws the following conclusions; first, that the greatest number of recoveries are obtained in the two first years; secondly, that the mean duration of cases that are cured is somewhat short of one year; thirdly, that after the third year the probability of cure is scarcely more than one in thirty. There are, nevertheless, examples which prove that we ought never to despair of the recovery of lunatics. M. Pinel, from Baumes, cites the case of a lady who passed twenty-five years in a state of lunacy, within the knowledge of the whole country where she lived, and who suddenly recovered her reason. "I have seen," says the same writer, "a girl who from the age of ten years was in a state of dementia, with suppression of the catamenia. One day, on rising from bed, she ran and embraced her mother, exclaiming, 'Mamma! I am well!' The catamenia had just flowed spontaneously, and her reason was immediately restored. Such facts are rare, but they serve to prove that from the duration of the disease alone there is no reason to despair altogether of recovery." [See the work of M. Esquirol, *Des Maladies Mentales* Paris, 1838.] A few instances of the same kind have occurred in several lunatic houses or public hospitals, from the superintendents of which the writer of this article has obtained information respecting them.

From another table published by M. Esquirol, it appears that, out of 269 maniacal patients, 27 were cured in the first month of their illness, 34 in the second, 18 in the third, 30 in the fourth, 24 in the fifth, 20 in the sixth, 20 in the seventh, 19 in the eighth, 12 in the ninth, 13 in the tenth, 23 after the first year, and 18 after two years. This is perhaps an attempt at a greater degree of accuracy in calculation than is, from the nature of circumstances, attainable. The same writer has made a remark in illustration of the greater

proportion of recoveries observed in the early period of madness, which is worthy of attention. He says, "I have constantly observed that in the course of the first month from the commencement of the disease a very marked remission takes place. About that period the maniacal excitement, which had previously run its course as an acute disorder, seems to have reached its termination as such, and it is then that it passes into a chronic state, the crisis having been incomplete. This remission, which I have watched with the greatest accuracy, must be attributed to the complaints which are complicated with madness at its commencement." The author implies, though he does not clearly express himself, that the natural termination of the disease, when unimpeded by complication with other maladies, or by more or less of organic lesion in the brain, is in the very early stage.

[It is exceedingly important to bear in mind the immense difference in the curability of insanity in recent and in chronic cases, which has been observed in other institutions besides those cited. In two "*Appeals to the People of Pennsylvania on the subject of a State Asylum for the Insane Poor*," which the writer prepared as Chairman of a Committee, the results in various insane establishments of this country were brought together. In one, the ratio of recoveries of those in whom the insanity was of less than 12 months' duration, was stated to be 82½ per cent.; whilst of the old cases it was only 15½ per cent. At the York West Riding Asylum, of 318 cases that had existed, according to Sir William Ellis, (*A Treatise on the Nature, Symptoms, Causes, and Treatment of Insanity*, Lond. 1838,) from one to thirty years, only 26 were cured; and of 173 old cases in the Bloomingdale Asylum, New York, in 1835, only 16 were restored.

Few patients who are more than 60 years old when attacked—it would seem from the experience of M. Esquirol—recover; and the result of the greater part of inquiries would appear to show, that restoration is most frequent in youth, and less so as age increases. Dr. Woodward, however, affirms, that in the Massachusetts State Hospital, at Worcester, persons attacked with insanity after forty years of age, recover in much greater proportion than those attacked before that age.]

Recoveries from madness are in many instances complete. There are numerous persons who have been insane for six or twelve months, or during a longer period, and have afterwards entirely recovered the vigour of their intellectual faculties, so as to be capable of as great and effective mental exertions as previously to the attack. Others, and perhaps these are the majority, are curable only to a certain point. These persons remain, as M. Esquirol has observed, in such a state of susceptibility that the slightest causes give rise to relapses, and they only preserve their sanity by continuing to live in a house where no mental agitation or inquietude, no unfortunate contingency is likely to fall to their lot, and throw them back into their former state. There are other individuals whose faculties have sustained such a shock that they are never capable of returning to the sphere which they had held in society. They are perfectly rational, but have not sufficient mental capacity to become again military officers, to conduct commercial affairs, or to fulfil the duties belonging to their appointments. Such cases may be about one-tenth in the number of recoveries.

Convalescents are as subject to relapse as those who are advancing towards recovery from other diseases. But lunatics are in many instances likewise prone to a recurrence of the disease after it has been entirely removed, or at least after its manifestations have long ceased to be observed. The same observation may be applied to other disorders of the nervous system. It would seem that one attack of disease has in these cases left the patient with a stronger predisposition than he formerly had to the complaint, whatever it may have been, and that the morbid tendency is strengthened after every renewed incursion. The most trifling circumstances have in these instances sufficient influence to produce the morbid condition of the brain and of the mind. At length the patient is scarcely ever in a lucid state; the intervals lessen in duration, and become more and more imperfect in degree, until disease finally becomes in a great measure permanent.

The proportion of cases in which madness is recurrent has been overrated. According to M. Pinel, in 71 cases out of 444 recoveries, relapse took place, or, rather, the disease was in those instances recurrent. This gives somewhat less than one-sixth of the whole number as recurrent; but the same writer allowed that out of the 71 cases 20 patients had previously relapsed, or had undergone several attacks, 16 had left the hospital at too early a period, 10 came afterwards under treatment and recovered without relapse, 14 had given themselves up to grief and intemperance, and several others were under circumstances unfavourable to continuance in health. M. Esquirol published a report of 2804 recoveries, in which number only 292 recoveries of disease took place, that is, a little more than one-tenth. M. Desportes, however, has stated that, in 1821, 52 recurrent cases were recognised at the Bicêtre, out of 311 admissions, that is, about 17 in a hundred; at the Salpêtrière in 454 admissions there were 66 relapses, about 15 in a hundred, or one-seventh. But in the proportion of recurrent cases indicated by this last report, it is probable that there were, as M. Georget has well observed, many cases which had been discharged in a state of incomplete recovery, as well as a considerable number of drunkards, who come habitually every year to spend a few weeks in the Bicêtre or the Salpêtrière, having been picked up in the streets in a state of intoxication.

In all instances we may consider it as certain that the improbability of recurrence increases with the length of the interval of time during which the patient has existed without manifesting signs of renewed disease, and that it is also greater in proportion to the completeness of the recovery. When the energy of mind is fully restored, relapse is much less to be feared than when it remains weak and excitable.

Second Termination—Fatuity—Dementia—Amentia.— The ultimate tendency of madness when protracted, and the state to which insane persons, if they do not recover, are in general sooner or later reduced, is that of fatuity. The fatuity which constitutes the last stage of mental derangement differs in its phenomena from con-

genital idiotism. It has more resemblance to the imbecility of extreme old age, but from this last affection, which we shall describe at the conclusion of the present treatise, it is distinguishable and in many instances very different. For the sake of greater precision we shall divide maniacal fatuity into two grades or stages. The first is that state which Esquirol and Georget have named *démence* or dementia, a term which is established by the authority of these writers, and has been received into general use; the second stage of fatuity, which is the last period of mental decay, and presents an almost entire obliteration of the faculties, may be properly distinguished by the term *amentia.*

1. *Dementia.*—The approach of dementation, or the first period of fatuity, is indicated by a comparative state of calmness succeeding to the previous excitement of the maniacal period. It is not the calmness of returning reason, but the result of mental activity worn out, the subsidence or obliteration of the affections or moral feelings, and the decay even of physical sensibility. It has been well remarked by M. Georget that the characteristic of dementation is a forgetfulness of the past, with a total indifference as to the present and future. Demented persons are generally quiet and inactive; they take little notice of persons or external things, without appearing to be occupied by any internal emotion or train of thought. They often, however, smile or laugh without any apparent reason, or sing, or pronounce, as if accidentally, single words or sentences. Some remain for days or weeks without uttering a word, or betraying by look or gesture the least consciousness of external impressions. Such impressions, however, are sometimes afterwards discovered to have been not entirely unobserved. Many appear, by their looks or replies to questions, to know and remember their friends or relatives, but scarcely display signs of emotion or sensibility on being visited by them. Not a few even in this state are capable of being employed in mechanical occupations. Females knit or sew, or perform any work with their hands to which they have been previously habituated; and men draw, or write letters or sentences, in which, however, their imbecility is generally conspicuous. Some patients have occasional periods of greater excitement, in which the symptoms of a more active state of madness resume their prevalence. In other instances mere physical activity displays itself at intervals in peculiar ways, as by running, jumping, or walking round continually in a circle or determinate figure.

The physical health of patients thus affected is in general tolerably good; they are often fat, have good appetites, digest their food, sleep well, and if in the previous stages of the disease they had been emaciated, they often recover their natural degree of plumpness on the approach of dementia. Hence the return of physical health without a corresponding improvement in the state of the mental faculties, is, as it has been remarked by the writer last cited, an unfavourable prognostic in cases of maniacal disease.

There are, however, some rare cases of recovery from this first stage of fatuity. Pinel informs us that many, especially young persons, who had remained in the Bicêtre several years or months in a state of absolute idiotism, have been attacked by a paroxysm of acute mania of twenty, or five-and-twenty, or thirty days' continuance. "Such paroxysms," he adds, "apparently from a reaction of the system, are in many instances succeeded by perfect rationality." The same result has been observed on the restoration of demented persons or of maniacs in the advanced stage of insanity after severe attacks of fever of that kind which is usually attended with delirium. Such attacks are often fatal to lunatics; but of those who recover them not a few are subsequently restored to the possession of their faculties.

These instances of restoration from fatuity take place only after the first stage. When the disease has passed into complete amentia, it is altogether hopeless.

2. *Amentia.*—Scarcely any exhibition of human suffering can be more deeply affecting than the aspect of a group of lunatics reduced to the last stage of fatuity, and those who have never witnessed such a spectacle can hardly imagine so abject a state of mental degradation. In a group of this description an individual may be seen always standing erect and immovable, with his head and neck bent almost at right angles to his trunk, his eyes fixed upon the ground, never turning them round, or appearing by any movement or gesture to be conscious of external impressions or even of his own existence. Another sits on a rocking-chair, which she agitates to and fro, and throws her limbs into the most uncouth positions, at the same time chanting or yelling a dissonant song, only capable of expressing a total inanity of ideas and feelings. Many sit constantly still, with their chins resting on their breasts, their eyes and mouth half open, unconscious of hunger or thirst, and almost destitute of the feelings which belong to merely physical life; they would never lie down or rise were they not placed in bed and again raised by their attendants. A great proportion of the patients who are reduced to this degree of fatuity are found to have lost the use of their limbs in a greater or less degree by partial or general paralysis.

From such a state it is scarcely imaginable that recovery ever took place, but patients in the last stage of fatuity often linger for many years. Their state, however, is not always uniform: some of them have comparatively lucid intervals, at which nature seems to make an effort to light up the mind and recall lost impressions and ideas. A patient has often been observed by the writer of this article, who sits all day in a wooden elbowed chair, with his chin hanging over his breast, appearing hardly conscious of existence and unable to assist himself in the calls of nature, who would not eat if food were not actually put into his mouth. He has been for several years in the same state, except that he occasionally appears to rouse himself, and for a short time to recover an unusual degree of animation. At such periods he will sometimes read a chapter in the Bible with a clear voice and a distinct and intelligible articulation.

3. *Of the termination of madness in Death.*—Madness is not to be reckoned among the diseases which are very dangerous to life. The state of the brain on which it depends, though incompatible with the continuance in a sound state of those functions on which the mental operations are as-

sociated, is yet such as to carry on other proccsses, dependent on the brain, which are subservient to physical existence.

This conclusion is established in a most convincing manner by the duration of insanity, and the cases even of longevity which occur among lunatics. We are informed by M. Desportes that among the lunatics at the Bicêtre in the beginning of the year 1822, one had been lodged there fifty-six years, 3 upwards of forty years, 21 more than thirty ycars, 50 upwards of twenty years, 157 more than ten years. At the Salpêtrière the entry of paticnts dated, 7 cases from fifty to fifty-seven years, 11 from fifty to sixty, 17 from forty to fifty.

The morbid state of the brain is, however, liable to increase beyond the limit above adverted to, and then the usual phenomena dependent on severe cerebral disease are manifested. It is well known that lunatics are subject in a much greater proportion than other persons to apoplexy, palsy, epilepsy, and all the trains of symptoms depending on different degrees or modifications of cerebral congestion.

Another mode by which madness brings on a fatal termination is by the exhaustion arising from continued excitement. There are many cases of maniacal disease in which the ceaseless excitement of the feelings, the constant hurry of mind and agitation of body, the total want of rest and sleep, and the febrile disturbance of the system which frequently ushers in the attack of madness, and is always a prominent feature in cases of this description, bring on a very marked reduction of strength as well as of flesh: the degree of emaciation is sometimes extreme. Generally this state of excitement gradually abates, or the means adopted to lessen it and tranquillize the system are attended with success; but this is not uniformly the case, and some maniacs die completely worn out and exhausted. It is in part owing to this cause that the mortality among lunatics is more considerable during the two first years from the period of their attack than in the succeeding years, a fact which appears to be established by the calculations of M. Esquirol. In the Salpêtrière the number of deaths is even much greater in the first year than in the second. Of 790 lunatics who died in that hospital between the years 1804 and 1814, it appears that 382 died in the first ycar from their admission, 227 in the second year, and 181 during the seven succeeding years.

Many lunatics are carried off by diseases of the abdominal and thoracic viscera, which are complicated with madness. Pathology does not enable us to explain the connection between organic diseases of the lungs or bowels and disordered action of the encephalon, and hence many have been inclined to regard the combinations of morbid states to which we now advert as accidental. They are perhaps too numerous to be attributed to chance. The combination of madness, as well as of some other diseases of the brain and nervous system, with diseased states of the liver and of the intestinal canal, was pointed out some years since by the writer of this article. The conjunction of insanity with pulmonary phthisis is a fact established beyond doubt by the observations of M. Esquirol, who remarks that phthisis often precedes the appearance of melancholia, or accompanies it. The disease of the lungs is in these instances latent; the patients lose their strength, become emaciated and suffer under slow fever, sometimes attended with cough and diarrhœa; the phenomena of madness rather increase than abate under these circumstances, and continue until death. On the examination of the body, the lungs are found tuberculated or affected by melanosis.

Diseases of the heart are not unfrequently complicated with madness. We are assured by M. Foville, that of the bodies of lunatics which he examined after death during three years, five out of six displayed some organic disease either of the heart or the great vessels. This was very frequently hypertrophy of the heart. These morbid changes, however, are probably, as M. Foville has observed, more frequently results of the continued agitation, the violent efforts and cries, which in such patients bring on diseases in the thoracic organs, than predisposing causes of cerebral disorder

Diseases of the intestinal canal, whether they exist or not at the onset of the maniacal attack, are subsequently among the frequent causes of death. A state of obstinate constipation often continues for a long time, attended by its usual accompaniments. It gives way, and is followed by or alternates with diarrhœa, which wastes the strength of the patient and terminates in a fatal dysentery. When the body is examined, the intestines are found sometimes distended and loaded with indurated matter, at others empty and pale, with disease of the mucous coat, discoloured and abraded patches or ulceration, and gangrenous spots.

In protracted cases death either results from increase in the disease of the brain, which up to a certain degree had only subverted the operations of that organ subservient to the mental function, and at length becomes incompatible with the merely physical functions of the same viscus; or it is the result of accidental disorders, which, owing to the peculiar state of the brain and other organs in lunatics, are more than usually fatal.

Fatuity or inveterate lunacy becomes complicated with paralysis. M. Esquirol says that of the number of persons who die in a state of lunacy, one half are paralytics. This paralysis of the demented is a peculiar affection, for we are not now referring to hemiplegia, attacks of which are liable to occur at all periods of madness, either ushered in by apoplexy or without it, and which frequently carry off maniacal patients. The general paralysis to which lunatics in the advanced stage are most subject shows itself first in the muscles of articulation; patients have some difficulty and imperfection in speech, which is in the beginning so trifling as to escape those whose attention is not particularly directed to the circumstance. The muscles of the limbs and trunk become subsequently affected; the patient walks with a tottering or shuffling gait, and his trunk is bent forward; his hands shake; his limbs become emaciated and feeble; sometimes he bends towards one side, and at length passes his time in a sitting posture, and bent forward, or takes to his bed when the sphincters gradually lose their power,

sloughs take place about the back, the sacrum, and elbows, followed by gangrene and death.

Many lunatics in the advanced stage labour under a degree of cachexia bordering on scurvy. The skin is beset with scaly or papular eruptions, or discoloured in patches; furunculi appear in different parts of the body, which are much disposed to become sloughy; the gums become red and sore, and bleed; the surface of the body is cold with a clammy perspiration; diarrhœa, and abdominal pains accompany these symptoms; the patient apparently suffers under defective nutrition and a gradual decay of physical life, and dies in a state of extreme emaciation or marasmus.

The preceding are perhaps the natural sequelæ of the diseases under which lunatics suffer in connexion with their original complaint. A great number, however, are carried off by disorders which may be considered as accidental, but to which the condition of body in patients of this description renders them more than other individuals liable. Fevers which assume more or less of the typhoid character, severe catarrhs, and pulmonary affections, are the most frequent of them. It will be supposed that fevers which affect the brain are fatal to lunatics, and such is the fact in a very marked degree.

The diagnosis of accidental diseases in lunatics presents, as M. Georget has well observed, remarkable difficulties. Some patients of this description are continually making unfounded complaints, deceived by their erroneous or fancied sensations. On the other hand, many lunatics labour under very severe affections without revealing them by an expression, either because these affections are latent and do not occasion suffering, or because the disturbed state of their minds does not allow their sensations to reach the centre of perception. In this last relation the medical treatment of lunatics is much more obscure and difficult than that of young children, because the latter are conscious of their ailments, and express them by their cries. "When we observe a lunatic, who had previously been agitated and furious, become morose and taciturn, and at the same time lose his appetite, seek repose, and display a suffering and dejected expression, we ought to examine him carefully: he is threatened with some acute disease. The development of symptoms will soon point out the seat and nature of the complaint, and consequently by what sort of means it is to be opposed. But chronic affections are so slow in their approach and concealed in respect to their symptoms, that they often reach to a very advanced stage before their existence is suspected, unless the organs affected are examined before their diseased condition has manifested itself. We find the lungs full of tubercles, with cavernous excavations and abscesses, or in a state of atrophy, in the bodies of individuals who had neither coughed nor expectorated, nor experienced pain or dyspnœa during life; they had become gradually debilitated, had taken to their beds, and after a continually increasing emaciation, had at length sunk. The disorganization of the lungs had only been discovered by the aid of auscultation and percussion. We must not then wait for the expression of complaints on the part of lunatics in order to have our watchfulness excited to the means which are necessary for preserving their existence."

SECT. IV. — **Of the Causes of Insanity.— Predisposing Causes.**

1. *Natural Constitution.*—Among the circumstances in the previous condition of an individual which prepare him for sustaining the attack of this disease, the most important is a certain peculiarity of natural constitution. This consists chiefly, as it is probable, in a particular organization of the brain and nervous system, rendering those individuals so constituted liable to become insane when exposed to the influence of certain agencies, which in other persons either give rise to a different train of morbid phenomena, or are, perhaps, devoid of any injurious effects. The constitutional peculiarity which predisposes to madness is not distinguished by any remarkable external characters. That such a natural tendency, however, actually exists, and in all instances is a necessary condition to the development of maniacal disease, is to be inferred from the consideration that similar exciting causes exert their influence on other persons without producing a like effect. Among the agents that give rise to madness, there is none more influential than intemperance, or the frequent use of ardent spirits. A considerable proportion of lunatics in the lower classes of society owe their disease to this cause. But it is only in a certain proportion of persons addicted to intemperance that the phenomena of madness make their appearance. Others, under the influence of the same noxious cause, are affected with apoplexy or paralysis; in many, the brain escapes and the liver becomes disordered, or dropsy takes place, with or without disease of the liver; in some, the lungs become the seat of morbid changes. It is evident that there must be an original difference in the habit of body whence arises the diversity of results brought about by the same or very similar external agencies. This original difference is apparently a peculiarity in the congenital constitution of each individual. It may be transmitted from parents, or it may arise *de novo*, as other varieties in the congenital structure are known to do. Hence it is comparatively of little moment, as far as an individual is concerned, to inquire whether his morbid predisposition has been derived by hereditary descent, or has sprung up with himself. It may, indeed, be observed that peculiarities which arise in a race are often common to several individuals even in the first generation. Albinos, for instance, though the offspring of parents of ordinary complexions, very frequently have brothers or sisters resembling themselves. In like manner, diseases which appear for the first time in a family often affect several members of it, who partake of the same peculiarity of temperament or congenital structure.

If these remarks are well founded, it must be apparent that hereditary madness is not less curable than a disease having symptoms of the same description, which has not been previously observed in the family of the person affected by it.

That the predisposition to madness, when it has once arisen, is frequently transmitted, is a fact too well established to admit of doubt; it constitutes a feature in the history of the disease.

The hereditary transmission of this tendency is

remarked by M. Esquirol to be more general among the opulent than the lower classes. He states the proportion of hereditary cases among the former to be one-half, among the latter to be one-sixth. This, however, seems to be a mistake, as it appears by his table that of 351 cases at the Salpêtrière, 105, or nearly one-third, had the disease by inheritance. Among 264 patients of a superior class 150 cases were, according to the same writer, hereditary. He accounts for this difference by referring to the exclusive marriages of aristocratical families, a cause which had formerly in France much influence. It remains to be determined whether the same difference is to be observed elsewhere under circumstances not admitting this explanation.

The same writer affirms that persons born before their parents had become maniacal are less subject to mental disease than those who are born after the malady had displayed itself. He makes a similar remark as to those who inherit the disease only on one side, in comparison with persons whose paternal and maternal ancestors had been affected by it. According to Burton the offspring of parents advanced in years are more subject than others to melancholy madness.

Another observation relating to the hereditary transmission of this morbid tendency is, that the disease is apt to show itself in different individuals of a family at a particular period of life, and in all of them under a similar character. M. Esquirol has made this remark, and he has mentioned several facts in illustration of it. "Two sons of a merchant of Switzerland died insane at the age of nineteen years. A lady, aged twenty-five years, was attacked by puerperal madness; her daughter suffered in like manner at the same age. In one family the father, the son, and the grandson, all committed suicide about their fiftieth year. There was at the Salpêtrière a prostitute who had thrown herself into the river seven times; her sister drowned herself in a fit of intoxication. There exists near Nantes a family in which seven brothers and sisters are in a state of dementia. A gentleman, affected by the first events of the Revolution, remained during ten years shut up in his chamber. His daughter, about the same age, fell into a similar state, and refused to quit her apartment. This predisposition, which manifests itself by external signs, by peculiarities in the moral and intellectual character of individuals, is not more surprising in connection with madness than are the instances of gout, of phthisis pulmonalis, and other diseases, in a different point of view. It may be traced from the age of infancy: it furnishes the explanation of a multitude of caprices, irregularities, and anomalies, which at a very early period ought to put parents on their guard against the approach of insanity. It may furnish useful admonitions to those who preside over the education of children. It is advisable in such cases to give them an education tending to render the habit robust, and to harden it against the ordinary causes of madness, and particularly to place them under different circumstances from those with which their parents were environed. It is thus that we ought to put in practice the aphorism of Hippocrates, who advises to alter the constitution of individuals in order to prevent the diseases with which they are threatened by the hereditary predisposition of their family."

M. Esquirol affirms that many facts have occurred within the sphere of his information proving a strong predisposition to madness to have arisen from some accidental fright sustained by the mother during pregnancy. Marked cases of this description are said to have occurred during the period of the Revolution.

2. *Age.*—Persons in the middle period of life are most subject to attacks of insanity properly so termed. M. Esquirol has remarked that imbecility is the predominant mental disorder of childhood, mania of youth, melancholia of more advanced manhood, and dementia of old age.

The years during which madness most frequently makes its first appearance are those between thirty and forty in the age of the individual; next to these are the years between twenty and thirty; thirdly, are those between forty and fifty. Insanity is comparatively rare in the earlier as well as in the later periods. The case, however, of a child who had been maniacal from the age of two years was noted by Joseph Frank at St. Luke's in 1802. M. Esquirol mentions besides three instances of maniacal children. Dr. Haslam and others have reported some cases of the same description, but they are not of frequent occurrence.

M. Georget has observed that out of the number of 4409 lunatics in different hospitals in France and England, 356 were between the ages of ten and twenty, 106 from twenty to thirty, 1416 from thirty to forty, 861 from forty to fifty, 461 from fifty to sixty, 174 from sixty to seventy and only 35 upwards of 70.

The following table, given by Dr. Burrows from Reports of the French hospitals, tends further to illustrate the proportional frequency of madness at different periods of life, and it has the advantage of distinguishing the sexes.

Ages.	Men.	Women.	Total.
From 10 to 19 —	78	62	140
20 to 29 —	198	267	465
30 to 39 —	248	324	572
40 to 49 —	231	290	521
50 to 59 —	132	218	350
60 to 69 —	119	146	265
70 to 79 —	76	101	177
80 to 89 —	7	4	11
Ages unknown.	6	0	6
	1,095	1,412	2,507
Under 50 years of age.	755	943	1,698
Above 50 years of age.	340	469	890
			2,507

3. *Sex.*—If we may believe Cælius Aurelianus, madness was among the ancients more frequent in males than in females. In France, according to M. Esquirol, the reverse of this statement is true. This writer attributes the greater comparative liability of modern females to the vicious system of modern education, to the preference given

to mere accomplishments, to the reading of romances, which gives to young persons a precocious sensibility, premature desires, and ideas of perfection which they nowhere find realized, to the frequenting of plays and assemblies, the abuse of music, and want of occupation. In England, he observes, where women have an education more strengthening to the mind, and where they lead a more domestic life, the proportion of female lunatics to the male is less considerable. These considerations may account for the facts in respect to the higher orders; but as the observation includes those who are the inmates of hospitals, we must have recourse, in order to explain it, to the physical circumstances in which the condition of females differs from that of the male sex. The difference is in fact so great in France, that M. Pinel, in 1802, calculated that there were two female to one male lunatic. According to the report "Sur le service des aliénés," by M. Desportes, made at Paris in 1823, it appeared that from 1801 to 1821 the number of males admitted at the Bicêtre was 4552, and that of females at the Salpêtrière during the same period, 7223. At Bethlem, according to Dr. Haslam, 8874 lunatics were admitted in the course of forty-six years, of whom 4832 were females, 4042 males. At St. Luke's, according to a statement made to a committee of the House of Commons in 1807, the number of females is usually greater than that of males by about one-third. In comparing a number of statements from different countries, M. Esquirol, however, concludes that the excess in the proportion of female lunatics is not so considerable as it is generally supposed to be, and that it does not, in fact, greatly exceed the difference which exists between the sexes in the ordinary state of the population. It is greater in some countries than in others, and in France than in England.

[Taking the result of inquiries in various parts of the civilized world, it would not seem that there is much difference between the sexes. Of 76,526 cases, enumerated with this view, 37,825 were males, and 38,701 females,—the ratio of males to females being thus as 37 to 38 nearly.]

4. *Celibacy.* — M. Georget was inclined to reckon celibacy among the predisposing causes of madness, from considering the following facts detailed in the report of M. Desportes.

Out of 1726 female lunatics 980 were single women, 291 were widows, 397 were married persons.

Out of 764 males 492 were single, 59 were widowers, and 201 were married.

These relative numbers appear remarkable, but in estimating the result we must take into our account the fact that married persons lead in general more regular lives than the unmarried, that they are generally more fixed in their pursuits and their condition as to maintenance and employment, and less subject to causes which agitate the mind and excite strong emotions. These remarks apply, however, principally to men, and the difference is equally great among females.

5. *Temperament.*—A constitution of body predisposing to violent passions also predisposes to madness.

With respect to complexion, which is generally supposed to denote varieties of temperament, it does not appear that there is any particular shade or hue of eyes or hair which marks a predisposition to this disease. On a comparison of facts collected from several countries, M. Esquirol has not been able to discover any decided difference. In the Parisian hospitals a chestnut colour of both eyes and hair prevails, which is the general colour among the people of the north of France.

6. *Season.* — M. Georget has given briefly the result of reports indicating the influence of seasons. It seems that during the six summer months a greater number of persons are received into the lunatic asylums than in the six months of winter.

[According to Dr. Woodward, (*Eleventh Report of the State Lunatic Asylum at Worcester, Mass.*, p. 41, Dec. 1844,) there were in winter the least number of admissions, the fewest discharges, and the fewest deaths.

M. Andral (*Cours de Pathologie Interne*) estimates the average frequency of insanity in the different seasons in the following order—summer, spring, winter, autumn. This applies especially to mania. Monomania and dementia appeared to occur equally at all seasons. In Naples, monomania was observed to be more frequent in the month of September.

As regards the termination of the disease, some have assigned the greatest number to autumn, and the greatest mortality to December, January, and February.

6*. *Moon.* — Not many years ago, it was universally believed that the full moon exerts a decided influence on the insane; hence the names *lunatic, moon-struck*, &c., applied to these unfortunates. It is now, however, settled by the observations of Drs. Haslam, Esquirol, Woodward, and others, that if the *light* of the moon be excluded, the insane are not more affected at the full of the moon than at any other period. Nor is the common idea of a direct influence of the sun at the summer solstice better founded. The whole effect, in the first case, seems to be induced by the stimulus of light; and in the latter, by that of heat;—the two being conjoined at the summer solstice, in consequence of the length of the days at that period. (See on this subject, the writer's *Human Health*, p. 184, Philad. 1844, and Dr. Woodward, op. cit., p. 67, Boston, 1844.)]

7. Among the most powerful of the causes which render persons obnoxious to madness, must be reckoned previous attacks of the same disease. When such attacks have been repeated, the predisposition becomes increased. There are instances, however, of persons who, during a certain period of their lives, have been subject to repeated attacks of maniacal disease, but have recovered entirely, and have lived many years in a state of perfect sanity.

8. Other diseases of the brain, such as apoplexy and paralysis, sometimes predispose to madness, or are followed by it. Epilepsy of a severe and inveterate kind is sometimes complicated with insanity. These cases are distinct from the fatuity which is often the result of long-continued epilepsy. The form of maniacal disease connected with epilepsy is peculiar, and this may be considered as constituting a distinct disease. It

has been ably described by the late Dr. Edward Percival.

9. *Education.*—An erroneous and unsuitable method of education is among the most influential causes of insanity. There are two different points of view under which the injurious effects of wrong education may be considered. By too great indulgence and a want of moral discipline, the passions acquire greater power, and a character is formed subject to caprice and to violent emotions: a predisposition to insanity is thus laid in the temper and moral affections of the individual. The exciting causes of madness have greater influence on persons of such habit than on those whose feelings are regulated. An overstrained and premature exercise of the intellectual powers is likewise a fault of education which predisposes to insanity, as it does also to other diseases of the brain. These are two considerations which are of the greatest importance with respect to the welfare of families to which an hereditary constitution may belong, rendering them more liable than others to cerebral diseases. They are distinct in themselves, and each might furnish a theme for an extensive treatise, most valuable in a practical point of view. Under the first head it would be necessary to consider the efficacy of those plans of education of which the professed object is to form a character remarkable for sedateness, for the strict discipline of the feelings, and, as far as this is attainable, for the abolition of strong passions and emotions. Such, undoubtedly, would be the kind of moral education best adapted for those who are constitutionally liable to insanity. The second remark, on the regulation of mental exercise in young persons whose nervous systems are feebly constituted, has a more extensive bearing than on the subject of insanity. It brings forward a suggestion which is of general interest in these times in which mental exertion is stimulated to the utmost, and when, in reality, all the physical and moral powers are sacrificed to the cultivation of intellect, or in many instances to the mere acquisition of knowledge.

Exciting Causes of Madness.—The immediate causes of madness are in part physical agents, and in part moral. Perhaps it may be remarked that the former are the most prevalent causes of madness in the lower ranks of society, and the latter in the higher class, whose intellects are more developed, and whose minds are subjected to more extensive influences.

1. Among physical causes of madness, one of the most frequent is the immoderate use of intoxicating liquors. There is hardly a tribe of the human race who have not succeeded in inventing some method of producing intoxication. Ardent spirits are perhaps, of all, the most injurious in their effects, particularly on the lower classes in the northern countries of Europe and America. It has been repeatedly observed that a large proportion of the cases admitted into pauper lunatic asylums arise from this cause. They are in general to be reckoned among the cases most easily cured; for, although this is not uniformly the fact, it often happens that when the exciting cause is removed, the effect begins to lessen, and eventually ceases. When these patients are prevented from obtaining stimulating liquors, and are treated with sedative remedies, they quickly show signs of amelioration and the subsidence of disease.

The use of opium and other stimulants is among the exciting causes of madness, though of much less general agency than the ordinary means of intoxication.

[Alcoholic liquors are a common cause of one form of delirium—*delirium tremens;* but, so far as the writer has observed, not of insanity. In this country, where delirium tremens has prevailed to a great extent, and where a good opportunity exists for noticing the effect of alcohol in inducing insanity, the writer's experience has not exhibited to him a great many that could be unhesitatingly referred to it. The fact, too, of the number of insane among the Society of Friends, who rarely indulge in any form of alcohol potations, is, so far as it goes, against the idea of alcohol being an extensive cause of mental alienation. It is proper to add, however, that in the Reports of most of the insane asylums, intemperance is recorded as a common cause.]

2. Blows on the head, and exposure to ardent solar heat, are well known to be occasionally the exciting causes of madness. It is plain that they act by bringing on inflammation, or a state bordering on inflammation, in the encephalon. The same remark may be made with respect to mercury, as used in syphilitic diseases. It is probably an error to suppose that syphilis is itself a cause of madness.

3. *Intestinal Irritation.*—A disordered state of the intestinal canal often becomes a cause of disturbance in the brain, by whatever antecedents the former disease may have been induced. The state of the intestinal canal, to which we allude, is itself much more frequently of an inflammatory nature than it has generally been imagined, or at least than it was formerly supposed to be. In that condition of the canal which gives rise to costiveness, alternating with diarrhœa, and accompanied with indigestion, flatulence and eructations, anorexia and nausea, transient but often acute pains in the hypochondria, livid and yellow suffusions of the skin, viscid secretions in the mouth, or redness of the fauces and palate, with a glazed and dry surface, the whole train of symptoms often depends upon a low degree of chronic inflammation in the mucous membrane of the intestinal canal; and this is perhaps a frequent, if not an ordinary state in those cases in which disorders of the nervous system supervene on complaints of the stomach and bowels. This form of disease has been described by Dr. Ferriar and several other practical writers; but it is to M. Broussais that we are indebted for a more ample development of its pathology.

The enteric disorder, which lays the foundation for maniacal symptoms, as well as for other affections of the nervous system, is the result in different instances of various and very diverse noxious causes. The most frequent is excess in the use of stimulant and indigestible food. Too great indulgence of the appetite among the more opulent, and among the lower classes long-continued constipation, unwholesome diet, the use of salt provisions, exposure to cold and want, or neglect of warm clothing, give rise to diseases of the same description.

Intestinal worms are one of the results of constipation. Madness produced by the last mentioned cause is probably of very rare occurrence. M. Esquirol has, however, mentioned a remarkable instance of maniacal disease, affecting a young man, who was cured at two different periods by the expulsion of a large quantity of worms from the intestinal canal.

4. *Causes depending on States of the Uterine System.*—States of the general system connected with irregularity of the uterine functions are well known to coexist with or to display themselves in various affections of the brain. Among them madness is one. Maniacal affections of this class may be mentioned under three heads.

a. Dysmenorrhœal Affections.—Some females at the period of the catamenia undergo a considerable degree of nervous excitement: morbid dispositions of mind are displayed by them at these times, a wayward and capricious temper, excitability in the feelings, moroseness in disposition, a proneness to quarrel with their dearest relatives, and sometimes a dejection of mind approaching to melancholia. These are distinct from the cases of hysterical affection connected with the same periodical causes of excitement. The former are sometimes the preludes of a far more permanent disease.

b. Suppressions of the Catamenia. — Sudden suppressions of the catamenia are frequently followed by diseases of the nervous system of various kinds. Females exposed to cold, undergoing powerful excitements, sustain a suppression of the catamenia, followed in some instances immediately by fits of epilepsy or hysteria, the attacks of which are so sudden as to illustrate the connection of cause and effect. In attacks of madness the catamenia are for the most part wholly or partially suppressed during the early periods, and in many cases it is not easy to say whether the suppression is the effect or the cause of the disease. There are instances, however, in which the circumstances sufficiently indicate the order of connection. Dr. Burrows has detailed a case in which suppression brought on by manifest causes was followed by mania. We have already alluded to the case of a young female mentioned by M. Esquirol, who suddenly exclaimed that she was cured of her disorder; her catamenia had flowed spontaneously, and her restoration to sanity was the immediate consequence. Facts so decisive in their bearings on pathology are not of very frequent occurrence, but their evidence reaches farther than the individual cases recorded.

It often happens that after some weeks or months in the duration of madness, the catamenia, though previously deficient, become restored nearly to their usual state. This, like the other indications of improvement in merely physical health, is only a favourable sign when it is accompanied by some amendment in the state of the mental faculties. Without any such change, it rather gives reason to apprehend that the disorder is becoming inveterate, and perhaps already making its transition from mania into an incipient stage of fatuity.

c. Puerperal madness is another modification of the disease connected with the state of the uterine functions. As this form of insanity is a most important subject, and in circumstances very peculiar, we shall allot a distinct section towards the conclusion of this treatise to the consideration of its history and pathology.

4*. [Excessive venery has been regarded by many as a cause of insanity, and especially of dementia. In the annual reports of several of our insane institutions and penitentiaries, many cases are referred to masturbation; yet its influence would certainly seem to be exaggerated by some observers. It is a common vice everywhere, and is very likely to be practised to a greater extent in such institutions; but it cannot be considered as by any means proved, that masturbation was the cause of the insanity in many of the reported cases. Often, doubtless, it is the effect.

A table of the causes assigned for insanity in different insane institutions of Great Britain and this country is given by Dr. Woodward, in the *Eleventh Report of the State Lunatic Hospital at Worcester, Mass.*, Boston, 1844.]

5. *Metastasis.*—The pathological fact, that diseases of the brain, and among others that from which madness results, supervene on the cessation of various discharges, on the healing of old ulcers, on the disappearance of cutaneous eruptions, on the cessation of inflammatory disease in membranous and other structures, on the removal of tumours, has been observed with greater or less attention by practical writers on medicine from the time of Hippocrates. Many cases illustrative of this fact are to be found in the works of Hildanus, Tulpius, and Hoffmann; and Sauvages, among the forms of madness, has reckoned one which he terms metastatic. M. Esquirol says that even a cessation of the usual discharge from the nostrils, of leucorrhœa, of blennorrhagia, as well as the disappearance of scabies, of herpes, of gout and rheumatism, has produced madness. In general it may be observed that the suppression of acute eruptions, whether pustular, exanthematic, or erysipelatous, is followed by acute inflammatory affections of the internal organs; in such cases the brain or its membranes are attacked by phrenitis or meningitis; while the disappearance of chronic disorder of the same class is the precursor of mental aberration. The suppression of more copious discharges, the removal of large tumours, the disappearance in dropsical cases by rapid absorption of deposited fluids without increased excretion, has been followed by determinations of blood to the head, giving rise to fatal apoplexy or severe convulsions.

6. *Moral Causes of Insanity.* — Among the moral causes of insanity we must reckon all the circumstances which are calculated to give rise to strong emotions, or to excite the passions. Strong emotions, by their operation on the nervous system, produce injurious effects on the brain, and give rise to disturbed actions in that organ, whence arises mental derangement. The passions and emotions are indeed the principal and most frequently productive causes of madness.

In barbarous nations, among whom the mind is uncultivated, the passions are proportionally impetuous, but their sphere is limited, and the intellectual and moral faculties are very imperfectly developed. Madness is comparatively rare among such nations. According to Von Humboldt there are very few lunatics among the native Ameri

cans, and a similar observation has been made with respect to other uncivilized tribes. In Russia, Turkey, and China, madness is unfrequent. In the hospital of Grand Cairo, a city containing 300,000 people, M. Desgenettes found only fourteen lunatics. It must, however, not be forgotten that in such places many deranged persons are suffered to wander about through neglect and the absence of regulations for police, and that their numbers thus escape observation; yet this circumstance is not sufficient to account for the entire difference between barbarous and civilized countries, in respect to the apparent frequency and rarity of madness. It might be affirmed that mental derangement is the result of a deviation from the state of nature, if we were to agree with those who look upon barbarism as the natural condition of our species, and represent all that is ennobling and exalted, all that is good and really desirable in human life, as foreign or accidental, and the produce of forced and unnatural culture. In this as in other instances, it has pleased Providence to mix up with the greatest blessings some portions of evil, some ingredients of intense suffering: "Medio de fonte leporum, Surgit amari aliquid, quod in ipsis floribus angat."

[It has been maintained, that the number of the insane is in a direct ratio with civilization; but the medical statistics of countries do not exactly establish this; although there can be no question, that civilized man is more subject to insanity than the savage. From estimates made by M. Brière de Boismont, it would appear, that in England the proportion of the insane to the whole population is 1 in 783; in Wales, 1 in 911; in Scotland, 1 in 573; in the Rhenish provinces, 1 in 1000; in Norway, 1 in 551; in France, 1 in 1000; and in Italy, 1 in 3785; yet it would scarcely be admitted, that the people of Norway are more civilized than those of France. The proportion of insane in the larger cities has been enumerated as follows: London, 1 in 200; Paris, 1 in 222; Milan, 1 in 242; Florence, 1 in 238; Turin, 1 in 344; Dresden, 1 in 466; Rome, 1 in 481; Naples, 1 in 791; St. Petersburg, 1 in 3133; Madrid, 1 in 3350; and Grand Cairo, 1 in 30,714. There is certainly a singular difference between these countries, as there would appear to be between the different states of this Union in the number of the insane; and the difference is by no means easy of explanation. In New Hampshire, when the population did not exceed 280,000, the number of lunatics was estimated at 600; in Connecticut, in a population of 298,000, at 700; in Massachusetts, with a population of about 612,000, there were 1000; and in Virginia, taking the population at 1,200,000, it is estimated that there were, in 1838, not fewer than from 600 to 800 insane persons. In New York, the ratio in 1835 was considered to be 1 in 887 and a fraction; and the probability is, that it is quite as great in Pennsylvania, where, under the lowest estimate, there were probably in 1841 not fewer than 2000 persons, lunatic and idiotic, of whom, it has been estimated, that about 1200 may be idiots. The census of the United States has not been taken with sufficient accuracy to enable us to deduce any satisfactory results.]

Various kinds of mental excitement have different degrees of influence in producing madness, under different social and political circumstances. Among the patients of the Salpêtrière, in 323 cases admitted during the years 1811, 1812, M. Esquirol reckoned 105 originating in domestic chagrins, 77 occasioned by poverty and reverses of fortune, 45 by disappointments in love, 38 by fright, 8 by fanaticism. Cases of what is termed religious madness are supposed to be much more frequent than this small proportion seems to imply, but it is much to be desired that we could determine the meaning of the expression religious madness, and to what examples of disease it may be correctly applied.

There can be no doubt that madness has often been produced by a vehement and impassioned style of preaching. "In the kingdom of Naples," says M. Berthollet, "a custom exists of preaching in favour of missions by a particular set of priests. In order to animate the faith of believers, they accompany their orations with particular acts, which are often of such a nature as to produce too powerful an effect on weak minds. They hold their hands over flaming torches, and whip themselves with scourges garnished with iron points. Their sermons are prolonged till the close of day, and the feeble glare of a few flambeaus heightens the effect of the scene." "One of these sermons gave occasion to the case I am about to describe. The subject was *hell:* to heighten the colouring of the frightful picture which the preacher had traced, he took a skull in his hand, and having raised a question as to the abode of the soul to which it belonged, he exclaimed, invoking it, 'If thou art in heaven, intercede for us; if thou art in hell, utter curses.' He then cast it from him with violence. The lady, whose case is subsequently described in M. Berthollet's memoir, was instantly affected by a morbid change in the nervous system.

Strong emotions excited by vehement preaching produce continually in females and very sensitive persons, fits of hysteria, and in those who are predisposed to mania there can be no doubt that similar causes give rise to attacks of madness. Cases, indeed, are of continual occurrence which establish the fact.

But the terrors excited by a troubled conscience, which have given birth in the imagination to gorgons and chimeras, and monsters of darkness, are sufficient of themselves to produce madness in persons predisposed. None can entertain a doubt on this subject who recollect the stories of men persecuted by the Furies, the appalling self-tortures and mutilations, the blood-stained altars and the hideous divinities, the sacrifices of wives and daughters, the gloomy and hopeless fatalism of the pagan world. There is no remedy for these evils, resulting as they do from the moral and physical disorders of human nature, but the mild and consoling influence of Christianity; and if this religion has been made in some instances the instrument of evil rather than of good, we must recollect that the greatest blessings are capable of becoming by perversion the fertile sources of severe calamities. Perhaps some persons may suppose that if it were possible to divest the minds of men of all religious anxieties at once, together with all belief, they would be gainers by the

change. But this experiment has been already tried in France, in a great part, during one period of the Revolution, and the following remarks of M. Esquirol display the results, as far as they relate to the increase or lessening of insanity.

"The changes," he observes, "which have taken place during the last thirty years in our moral sentiments and habits, have produced more instances of madness in France than all our political calamities. We have exchanged our ancient customs and fixed habits, our old and established sentiments and opinions, for speculative theories and dangerous innovations. Religion now only comes forward as a formal usage in the solemn transactions of life; it no longer affords its consolations to the afflicted, or hope to the desponding. Morality founded on religion is no longer the guide of reason in the narrow and difficult path of life. A cold egotism has dried up all the sources of sentiment; there no longer exist domestic affections, respect, attachment, authority, or reciprocal dependencies; every one lives for himself; none are anxious to form those wise and salutary provisions which ought to connect the present age with those which are destined to follow it."

Sect. V. — **Necroscopical Investigations of Madness.**

Recourse has been had to anatomical investigations with a view to illustrate the pathology of madness, and although such researches have not answered fully the expectations with which they were entered upon, they have led to results by no means devoid of interest in their physiological bearing, and capable, though to a limited extent only, of practical application.

This department, as well as most others, of pathological anatomy, may be said to begin with Morgagni. That celebrated writer has, however, related the details of but seven or eight dissections referring to cases of insanity. In these he remarked several facts which later observations have confirmed. He found the substance of the cerebral hemispheres more firm, and that of the cerebellum softer than natural. In one instance the white substance of the cerebrum was hard and of a brownish hue, and its blood-vessels, as well as those of the plexus choroides, much distended with blood: in another there was hardening of the hemispheres and softening of the fornix, fulness of the cerebral vessels, adhesion of the pia mater: in a third, injection of the meninges and the plexus, hardening of the brain, and softening of the cerebellum. This writer mentions also collections of serous fluid in the ventricles and in the tissue of the pia mater.

The researches of Greding were much more extensive, and his observations more various. Among the facts remarked by him are thickenings of the cranium, either partially or generally observed in 167 ordinary maniacal cases out of 216, in 78 out of 100 cases of raving madness, and in 22 out of 30 cases of idiotism or imbecility; softness of the brain in 51 cases out of 100, especially in mania complicated with epilepsy; wasting of the optic thalami in two cases of dementia; enlargement and contraction of the ventricles; serosity in these cavities, or dryness of their surfaces; adherence of the dura mater to the skull; thickened and blue colour of the pia mater; softness of the tubercula quadrigemina; osseous or stony concretions in the cerebellum.

Dr. Haslam has given the details of 37 cases of madness with the appearances discovered on dissection. In not one of these cases were the brain and its membranes free from morbid appearances. In almost all, the membranes either bore marks of former inflammation or were distended with blood: in 16 cases there was an effusion of serum between the membranes, and in the lateral ventricles this was observed eighteen times. In nine cases the consistence of the brain was firmer than usual; in seven it was softer, but in 20 not perceptibly altered. In three cases, the cranium was thicker, and in three thinner than the natural state. In several cases a peculiar looseness of the scalp was observed.

The following are the most remarkable of the observations made by M. Esquirol on the morbid appearances of the brain in madness. The cranium thick and compact; in other cases thin and porous; often injected with blood: crania irregular in respect to the different diameters, and to the cavity of the two sides. Membranes thickened in 11, injected in 19 cases. Basilary arteries ossified in 5 cases. Cerebrum dense in 15, soft in 19 cases. Cerebellum dense in 12, soft in 17 cases. Grey substance abundant in five, discoloured in 15 cases. White substance injected in 19 cases. Adhesions of the lining membrane of the ventricles in 54 cases. Serous depositions frequent between the pia mater and the arachnoid, as well as in the ventricles. Plexus choroides displaying almost always serous vesicles, (kystes séreuses.) Many other morbid changes have been pointed out by the same writer, such as tumours, vesicles (kystes), partial softenings and ossifications of the arachnoid. Two cases of acute maniacal disease, observed by M. Esquirol, are recorded by M. Georget, (Art. *Encéphalite*, in the Dict. de Médecine,) in which the brain presented all the characteristics of intense inflammation.

M. Georget has recorded with great precision the facts which he has himself observed. The following are the most remarkable. Irregular conformations of the cranium, the prominences of which are developed irregularly, those of the right side being generally larger than those of the left; some skulls having the lateral diameter of equal extent with the antero-posterior, and the cavities of the base irregular in extent; some skulls, one in 20, thickened partially or generally; more frequently the bones hard, white, without diploë, resembling ivory; some very light. Dura mater rarely changed; sometimes adherent to the skull, thickened, containing deposits of bone. Arachnoid displaying in places additional laminæ of a red or grey colour; sometimes thickened but smooth. Pia mater injected; or thickened and infiltrated with serum, giving at first the appearance of a gelatinous deposit. Volume of the brain sometimes less than the cavity of the cranium seems to require. Some brains very hard, cut with difficulty; the white substance glutinous, elastic, and suffering distension; more frequently the brain is soft, the grey matter being pale and yellowish, and the white substance discoloured, of a dirty white, the colour and consistence of

these portions almost confounded. The convolutions separated by serosity and the pia mater thickened. Interior cavities of the brain appearing in some instances very large, in others small, often filled with a serous fluid remarkably clear and limpid; plexus choroides exanguious, containing hydatidiform vesicles. Partial softenings of the brain; erosions, ulcerations of the surface of the ventricles. Cerebellum generally softer than the cerebrum; sometimes partially softened. Mesocephalon, medulla oblongata, and medulla spinalis rarely display morbid changes of structure.

M. Georget has thus summed up in a short compass the morbid changes which have been observed in the heads of maniacal subjects. 1. Bones of the cranium sometimes thickened, sometimes without diploë, thick and resembling ivory; sometimes light and spongy; inequalities in the form of the cranial cavity. 2. Injections, thickenings, serous infiltrations of the pia mater; separations and attenuations of the cerebral convolutions. 3. Surface of the cerebrum softened and adhering to the pia mater, so that the latter, when pulled off, raises portions of the cerebral substance with it; injected state of the cerebral substance, reddened colour of the grey portion, marbled violet hues in the white portion, increased consistence of both; discoloration and general softening of the cerebrum, grey substance yellowish, white substance of a dirty white; serous collections in the ventricles, particularly in the lateral ventricles; partial softenings. Other alterations are much less frequent; the annular protuberance, and the four great nervous trunks which take their rise from it, the medulla oblongata and the medulla spinalis, are rarely found to have undergone any material change of structure.

Some curious and interesting additions have been made to the morbid anatomy of madness by M. Foville, whose researches were conducted with great accuracy. It was a part of his plan to compare, in every instance on the spot, healthy brains with those which were the subjects of examination as having appertained to maniacal patients. By this method some minute peculiarities of structure seem to have been detected which might otherwise have escaped notice. M. Foville's inquiries were carried on at the Salpêtrière in conjunction with his colleagues, MM. Delaye and Pinel Grandchamp, when that hospital was under the superintendence of M. Esquirol, and subsequently by himself at the establishment of the Lower Seine, an extensive receptacle for lunatics, which has been for some years under his immediate care. His observations are arranged under the following heads; 1. morbid changes in the cortical substance; 2. changes in the white or fibrous substance; 3. changes in the nerves of sensation; 4. changes in the membranes; 5. observations on the skull and the hairy scalp; 6. changes observed in idiots. We shall abstract the most remarkable phenomena noticed under several of these divisions.

1. *Changes in the grey substance.*—In the most acute cases the surface of the cortical portion presents, on the removal of the membranes, a most intense redness, approaching to that of erysipelas. This is still more marked in the substance of the grey matter itself; it is more striking in the frontal region than on the temporal lobes, and in the higher regions than in the posterior parts of the brain. In brief terms the morbid changes observed by M. Foville in *acute cases of madness* are nearly confined to the following: "Red colour, uniform and very intense; numerous mottled spots, varying from a bright to a violet red, bloody points, minute extravasations of blood; diminished consistence in the thickness of the cortical substance, coincident mostly with a slight increase of consistence in its surface; dilatation of the vessels, resistance of their parietes." In acute cases M. Foville has never observed adhesions of the membranes to the cortical substance. Such adhesions are very frequent in chronic cases, and hence, as he conjectures, may be explained the curable nature of recent maniacal affections, and the hopeless and incurable state of those patients who have long laboured under madness or dementia.

Among the chronic changes of the cortical substance, the most frequent is a very perceptible increase of firmness and density in the superficial part, extending to no great depth, but uniform, constituting a distinct lamina, smooth externally, but internally irregular, of a lighter colour than usual, which, when torn off, leaves the remainder of the cortical substance red, soft, and mammillated, somewhat resembling granulations. Something like this external pseudo-membrane of the cortical substance has been noticed in wild animals which have died in a state of confinement, by M. Foville, and is conjectured by him to denote a cerebral disease in them. The pale and almost bleached hue of the surface of the cortical portion is always connected with this increased density in its substance. Sometimes the surface is rough and granulated, containing small grains of a yellowish white.

In conjunction with these changes the volume of the convolutions remains natural, or is less than usual. When lessened, there are sometimes linear depressions or irregular pittings on the surface of the convolutions, and in the cortical substance itself there are small yellowish lacunæ filled with a serosity of the same tinge. These lacunæ are supposed to correspond with the minute extravasations observed in acute cases. In other instances the diminution of volume is a real atrophy of the convolutions, which appear thin and angular, as if pinched up towards their extremities. This morbid change corresponds with what MM. Gall and Desmoulins have termed atrophy of the convolutions. It is very frequent in the frontal regions of the hemispheres. It often comprises particularly three or four convolutions on each side of the sagittal suture, a chasm filled with serosity occupying the place left by absorption of the cerebral substance. Co-extensive with this appearance is that species of atrophy in the cranium in which the diploë disappears, and the external lamina approaches the internal, leaving a superficial depression on the head. In these cases of atrophy of the convolutions, the diminution of substance is confined frequently to the cortical or grey matter. What remains of the cortical substance is harder than natural, and sometimes presents, when carefully examined, a really fibrous structure: it is of darker colour, or seems to separate into layers, of which the exterior is pale and the interior of a rose colour.

Another state of the cortical substance observed in chronic cases of madness is that of softening (ramollissement); this is entirely distinct from the softened state of the external portion already described. The whole thickness of the grey substance is equally altered in these cases; its colour is more brown than usual; its consistence almost liquefied.

This extreme and general softness of the cortical substance does not necessarily accompany a similar state in the white substance; it is sometimes conjoined with a hardened state of the medullary portion. In such instances the grey may be separated from the white matter by pouring water upon it. Appearances of this kind seem to belong to cases of the last degree of dementia, with general paralysis and marasmus. M. Foville mentions cases apparently of the same nature, in which limited portions of the grey substance had disappeared previously to death. M. Calmeil, in his work on the paralysis connected with insanity, has related two instances of a similar description.

It seems that the grey substance in other parts of the brain is not subject to a similar change; its morbid alterations coincide with those of the medullary portion. From this remark must be excepted the cortical substance of the cornu ammonis, which is sometimes softened, and at others of a scirrhous hardness.

2. *Morbid changes of the white substance.*—Morbid alterations of the white or fibrous substance in mad persons are in relation to its colour, its density, and its texture.

The white substance is often the seat of vascular injections; sometimes vessels of a certain size being affected, the appearance of bloody points is produced on the section of the white substance. In other instances a finer injection gives rise to a mottled appearance of a deep red or violet colour. A magnifying glass is required in order to discover the vascular injection which produces this appearance. These injections of the white fibrous substance do not always coincide with similar injections of the surrounding cortical substance.

It is not rare to find in lunatics the fibrous substance of a splendid white; this particular aspect generally corresponds with an increased density of the parts. The hardness of such parts of the brain is sometimes almost fibro-cartilaginous. The induration of the medullary substance is, however, not always connected with this remarkable whiteness; sometimes the hardened medullary substance has a yellow tinge or a grey leaden colour. M. Foville attempts to account for this hardening of the fibrous portion of the brain by the supposition that each cerebral fibre has contracted morbid adhesions with the surrounding fibres, so as to render their separation impossible. This opinion is offered as more than conjecture with respect to the different planes of medullary substance, of which it is considered as proved that the white substance of the brain consists. The fibrous mass of the hemispheres results, according to this writer, from the superposition of several distinct layers or planes, applied one upon the other, and connected by means of a very fine cellular tissue. These planes are easily separable in the healthy state, but in the state of maniacal induration they are inseparable.

Among lunatics affected with general paralysis, M. Foville has found these adhesions wanting in only two cases; and in these two instances the cerebral nerves, the annular protuberance, and the medulla oblongata presented an extreme hardness. The same alteration has been found in the brains of old men whose voluntary movements have become uncertain or vacillating; it has never been seen in lunatics whose muscular powers had remained unimpaired.

The brains of some lunatics are so full of serous fluids, that an abundant serosity flows from the surface of incisions; sometimes this serous infiltration is so abundant as to deserve the name of cerebral œdema. A change more rare, which M. Esquirol has remarked, was the presence in the brain of a multitude of small cavities, from the size of a millet-seed to that of a nut, containing a limpid fluid. The section of a brain thus changed is compared to that of a porous cheese. The cavities are supposed to be the sequelæ of extravasations.

The changes in the structure of the cerebellum are analogous in kind to those of the cerebrum, but much more rare.

Tubercles and other tumours in the brain are not considered by M. Foville among the causes of madness properly so termed.

3. *Morbid changes in the Nerves.*—M. Foville is persuaded that he has traced morbid alterations in the nerves corresponding with peculiar phenomena of sensation. In a female lunatic, tormented by hallucinations of sight, the optic nerves were found hard and semi-transparent through a great part of their thickness.

4. *Morbid changes in the Membranes.*—In acute cases the only morbid appearance discovered in the meninges is for the most part injection of the pia mater. This injection is generally proportioned to the degree of inflammation in the cortical substance of the convolutions. The small arteries and veins, passing from the membrane and penetrating the grey matter, are seen distended with florid or black blood: the arachnoid in the mean time preserves its natural aspect.

The chronic changes in the membranes consist for the most part in opacity, increased consistence, thickness of the arachnoid, the formation of granulations, and pseudo-membranes on its surface, and the effusion of serosity into the cellular tissue of the pia mater and the ventricles.

The arachnoid membrane displays either extensively or in patches a pearly whiteness. The opacity never exists without thickening; and in those places where the arachnoid and pia mater are naturally contiguous, they are found to be adherent. These opaque patches, as M. Foville supposes, result from the deposition of albuminous layers upon the arachnoid.

The observations of the same writer on the peculiarities observed in the skulls of lunatics add little to our previous knowledge on this subject; and his remarks on the conformation and texture of the brain in cases of idiotism do not necessarily belong to the subject with which we are now engaged. We shall conclude our abstract of his observations by briefly citing his general inferences.

"The morbid changes which we have surveyed, present many of the anatomical characters of inflammation; intense, general, diffused, redness; in many cases tumefaction; and lastly, in passing to the chronic state, the formation of adhesions between the cortical substance of the convolutions and the contiguous membrane; besides this, adhesion of the different planes or layers of the cerebral substance to each other in a certain number of cases.

"If the simple redness, the perceptible tumefaction—if the general and partial softenings, the increased resistance which we have noted in acute cases, left any doubt of the true nature of the organic disorder, the adhesions observed so often in chronic cases certainly admit of none; and we are forced to allow that there exists in the brains of lunatics a state of true inflammation, unless we cease to regard the adhesions observed in other parts as undoubted traces of such a state, and refuse to admit that adhesions of the pleura, peritoneum, and pericardium, afford evidence of the former existence of pleuritis, peritonitis, and pericarditis.

"As the different traces of inflammation are more constant in the brain than in the membranes, it is necessary to conclude that the essential change has taken place in the brain, and that the change produced in the membranes is only accidentally complicated with it." In his remarks on this subject, M. Foville plainly means to express his dissent from the opinions maintained by M. Bayle, who, in his treatise "Des Maladies du Cerveau," attributes insanity to disease of the membranes.

Among the morbid appearances of the brain, the varied changes of the cortical substance are the most constant in connection with symptoms of mental derangement. Although M. Calmeil maintained a different opinion, and was inclined to ascribe paralysis or the loss of muscular power to disease of the cortical substance, the facts on which he founded this inference do not, as M. Foville contends, warrant such a conclusion. In all instances of the general paralysis of lunatics which he has examined by dissection, there was, besides the change in the cortical substance, some alteration, either hardening, serous infiltration, or softening of the white substance; and in most cases, in addition to these appearances, there were adhesions of the principal planes of the cerebral substance to each other. A very remarkable case which occurred in the clinical course of M. Esquirol in 1823, affords strong evidence in favour of M. Foville's argument. The cerebrum of an idiot displayed the grey substance of both hemispheres in the last stage of atrophy and disorganization, while the white portion of the brain remained perfect on one side. In this person the intellect had been entirely defective, but the muscular power on one side only had failed. From this, and similar observations, M. Foville concludes that the function of the cineritious portion of the brain is essentially connected with the intellectual operations, and that of the fibrous or white structure with muscular action. His two principal inferences are expressed in the following terms:

1st. Morbid changes in the cortical substance are directly connected with intellectual derangement.

2d. Morbid changes in the white substance are directly connected with disorders in the motive powers.

The remarkable accuracy of these researches throws a strong shade of doubt, and even of improbability, over those recorded cases of maniacal disease in which *no morbid* traces were discovered in the anatomical examination. There is much reason for suspecting that a more exact scrutiny, and a careful comparison of the state of the parts with the appearances displayed by the same organ in a natural and healthy condition, might have led, in some of these instances, to the detection of morbid lesions, greater or less in extent. Yet it is not improbable that degrees and modifications of maniacal disorder have taken place, in which such changes might have been, in an early stage, hardly to be traced *with certainty*. In cases of insanity displaying no general disturbance of the intellectual operations, and principally consisting in a morbid state of the temper and affections, and in recent examples of monomania, we should not expect to find strongly marked changes in the brain, and there is indeed but little proof that the brain is in some of these cases diseased. And where there is more considerable disorder in the functions of the brain, arising secondarily or by sympathy with the state of other organs, the traces of such disorder may be very evanescent. It has likewise been remarked by M. Foville, that in some accidental affections of the maniacal class, succeeding the action of debilitating causes, as in the puerperal state, nothing has been discovered in the brain more striking than its extreme and general paleness, and, that although there are in these instances some mottled appearances of a light red or rose colour on the cortical substance, such changes are too slight to be considered as idiopathic. The same writer adds that in the small number of cases of this description which he has had an opportunity of examining, the disorder in the brain has appeared to him to be sympathetic of some deeply-seated disease of the uterus or abdomen. In general, however, the fact is unquestionable that insanity depends upon organic lesion of the brain, and we have sufficient reason to conclude that this lesion is, in its commencement, a degree or modification of inflammatory action.

Sect. VI.—Treatment of Madness.

Division of the Subject.—Moral and Medical Treatment.—The proximate or immediate cause of mental derangement is so much concealed from our research, the phenomena of the disease are so complicated, and the morbid states of the constitution with which they are connected so various, that we might foresee no ordinary difficulty in the attempt to lay down, with respect to this class of disorders, any general principles or indications of cure. In reality this task has been found to be a more arduous one than even the circumstances adverted to would have led us to anticipate; and hence many writers have given it up, and rest satisfied with stating as merely experimental results the effects which particular remedies have been thought to produce.

It is usual to divide under two heads the different means which suggest themselves to our consideration for the cure of madness, and to take up

separately what relates to the moral treatment of the insane, or the means supposed likely to exercise a beneficial influence on the mind; and, secondly, the medical or therapeutical remedies, properly so termed. As this mode of arrangement is attended with some advantages, and as no practical objection has been raised against it, we shall keep it in mind in proceeding to the subject now to be considered, beginning with the medical or therapeutical treatment of insanity.

Medical Treatment of Insanity.—The medical treatment of insanity may be referred in a great measure to two indications or principles, which in many cases may be followed more or less fully, and will in general serve the purpose of associating in the mind the different curative attempts which may be made with some hope of success. There are, indeed, instances of the disease to which these indications are either inadmissible, or can only be adopted in a very limited extent; but such cases may be considered as exceptions.

I. The first indication is to remove or lessen that diseased condition of the brain on which we have reason to believe that madness is, in some part at least, dependent.

That the diseased condition of the brain here referred to is nearly allied to inflammation, that all its essential pathological characters are those of inflammation, may be concluded from the following considerations.

1. The morbid appearances displayed by anatomical researches in the brain and its investments are, as we have seen, generally referable to the immediate results or more remote vestiges of inflammatory action. On this head we shall add nothing to what has already been said in the last section, and refer the reader particularly to the facts there accumulated, and the concluding remarks upon them.

2. The relations of madness to other diseases, which are known to be connected with increased vascular action, or at least with increased fulness in the vessels of the brain, tend to support the same inference. The connection of apoplexy and paralysis, of epilepsy and of other cerebral diseases, with madness, has been pointed out by medical writers. These diseases are occasionally converted into each other, or mutually succeed each other, and undergo alternations. They display such a relation as leads us to believe that the proximate causes or the morbid changes on which the symptoms immediately depend, are in all analogous. Therefore, as some of the class, apoplexy for instance, and paralysis, are connected with vascular fulness in the brain, it is hence probable that a state not far removed from this, and at least likely, under the influence of slight causes, to pass into it, gives rise to the phenomena of madness.

The metastasis of inflammatory diseases from other parts of the body, among which is included the recession of cutaneous eruptions, is well known to be followed not unfrequently by the appearance of maniacal symptoms. Suppressions of catamenia and other discharges, giving rise to similar diseases, strongly confirm the same pathological principles.

3. The causes in general which excite madness bring us to the same conclusion. These are principally of a description likely to give rise either to inflammation in the brain, or to a full and distended state in the vessels of that organ. Exposure to severe heat or cold, insolation, concussion or other injuries of the head, intoxication, and generally excess in the use of stimuli, great mental excitement, are all of this class; the condition of the brain, which it is the tendency of these agents to promote, is either inflammation, or something bordering upon it.

These different considerations concur in rendering it probable that the actual condition of the brain which immediately gives rise to the phenomena of madness, is in general one of high vascular excitement or turgescence, a state which, if it does not really constitute inflammation, is at least closely bordering upon it, and so liable to pass into it, that all the usual consequences of inflammation in many instances arise from it.

But though we may be correct in drawing this inference as a general one, there are great difficulties to be overcome, and much remains to be proved, before we can be authorized to insist upon it as universally applicable. The phenomena of mental disease are so various, and even so diverse, that they may be thought, not improbably, to arise from very different states of the system. There are instances of mental disease conjoined with so much atony and debility, subsidence of vascular action, coldness of surface, and diminished secretions, as to indicate a very different state from that of inflammation. Anatomical researches display in these instances a pale discoloration of the brain, with abundance of serous fluid, softenings of substance, and other phenomena of a similar description. Here we trace a state different from inflammation, though perhaps its remote consequence.

Are there not, likewise, cases in which we are scarcely authorized to conclude that any disease of the brain has ever existed? Instances of moral insanity, in which obliquity of character exists through life, and scarcely ever amounts to aberration of intellect, and some cases of monomania, in which slight and transient hallucinations supervene upon moral obliquities of the same description, and appear at intervals, cannot perhaps be referred with any degree of probability to an active state of disease in the encephalon.

It is probable, on the whole, that such exceptions bear a small proportion to the number of cases to which the preceding remarks on the pathology of madness are applicable.

If these remarks are well founded, they lead at least to one practical indication for the general treatment of madness. In proceeding with the medical treatment of maniacal diseases, we shall do well to bear constantly in mind the probable condition of the brain, and to direct our practice more or less with a reference to it.

Yet we must not omit to observe that the physician who proceeds to treat cases of madness as instances simply of inflammation in the brain, and who expects to cure it at once, like any other local inflammatory disease, by the direct operation of antiphlogistic means, will very often find himself greatly disappointed. He will meet with many cases in which no perceptible benefit arises from bleeding, evacuations of all kinds whether general or locally applied, and combined with the whole series of remedies supposed to be required by the

existence of organic inflammation. Many patients will sink under such a course of treatment if carried on incautiously: it will leave the disease undiminished, and exhaust the powers of life. This depends, perhaps, on the influence of diseased states in other structures and organs, or on disordered functions of other parts which are complicated with, and in some instances give rise to, the disturbances existing in the brain. Inflammatory excitement is a part of the disease, but does not entirely constitute it, even in so far as the brain is concerned.

Perhaps we may venture on the assertion, that there are few instances of madness in which the practical indication arising from the view which we have taken of the pathology of this disease will not be found applicable during some periods of the case, though in many its application is very limited. The degrees in which it is admissible are very various.

In recent cases of mania, properly so termed, and of incoherent insanity, particularly in young and plethoric subjects, and where the disease has made its attack suddenly, and is accompanied with signs of considerable vascular excitement, much may be hoped from the antiphlogistic treatment, at least from certain parts of it judiciously modified. We shall now consider the different means of which it consists, and advert to the opinions of some of the most eminent practical writers with respect to their use in cases of insanity.

1. *Of Bleeding.*—Cullen recommends bleeding in the early stage of madness. He says that it has been common to employ this remedy in all cases of recent mania, and, as he thinks, with advantage. He observes that when the disease has subsisted for some time, he has seldom found bloodletting to be of service. "It is," he says, "a proper and even a necessary remedy in those instances of madness in which there is fulness and frequency of pulse, and when marks are observed of increased impetus in the vessels of the head." He prefers bleeding from the arm, while the patient remains in somewhat of an erect posture, and bringing on a degree of deliquium, which, he says, is a pretty certain mark of diminished fulness and tension in the vessels of the encephalon.

Pinel, whose authority could not fail to produce an impression, is in this respect decidedly opposed to Cullen. He considers the signs of vascular plethora in the head, or of determination of the blood thither, as very deceptive; and although he allows bleeding to be in some instances capable of averting attacks of recurrent madness when they are anticipated, he carefully abstains from the use of the lancet after the disease has actually broken out. Care is always taken, he says, to question the relatives of patients admitted into the hospital over which he presided, whether bleeding has been practised, and if so, what were its results. "The reply always proves that the state of the patient has changed for the worse immediately after bleeding." Pinel held very firmly the opinion that bleeding, even in maniacal cases which are accompanied by circumstances supposed to indicate plethora and local determination to the head, tends to retard recovery, to render it more doubtful. He is even persuaded that bleeding gives to the disease a tendency to degenerate into dementia or idiotism. The facts, however, which this distinguished author adduces as proofs of his opinion, afford, as M. Foville has remarked, but very equivocal evidence. "Two girls," he says, "nearly of the same age and temperament, were admitted into the hospital (the Salpêtrière) on the same day: one of them, who had not been bled, was cured in the space of two months; the other had undergone a copious bleeding. She sank into a state of idiotism, or rather of dementia, and did not recover the faculty of speech till the fifth month. Her perfect restoration took place at the end of the ninth month." Now, as most authors fix the mean duration of madness at the period of several months, and some at more than a year, this case of recovery at the end of the ninth month cannot afford a strong condemnation of the practice pursued. Another case, which the same author has adduced as affording evidence against bleeding, is not more conclusive in respect to the influence of remedies on the ultimate event of the disease. Yet the opinion of such a writer, founded as it was, at least by himself supposed to have been, on extensive observation, ought not to be entirely disregarded because he happened to select but dubious illustrations. If bleeding occasions a state of collapse in the system, and is carried beyond what is necessary to reduce an over-excitement, a fatuitous dejection of mind is likely, in some cases, to be the result.

M. Esquirol coincides with Pinel in the opinion that the diseased state on which mental derangement depends, is sometimes changed for the worse by bleeding. He says that he has seen madness increased after an abundant flow of the catamenia, and likewise after one, two, or three bloodlettings. In such cases melancholy dejection has passed into furious madness. Yet M. Esquirol approves of moderate bleeding in plethoric cases, and where some habitual sanguineous evacuation has been suppressed. He has often, with advantage, applied leeches behind the head or to the temples of patients who are subject to sudden determinations of blood towards the head. His favourite remedies in such cases were the use of a few leeches at a time, repeated as often as necessary, and cold applications to the head.

To outweigh the authority of those writers who either condemn the practice of bleeding in madness, or allow of its adoption in so sparing a degree, strong evidence is requisite, but such evidence we possess.

Dr. Haslam says that bleeding is the most beneficial remedy that has been employed in madness, and that it is equally beneficial in melancholic as in maniacal cases. He limits its use to recent cases and plethoric habits, and directs it to be performed by the application of six or eight cupping-glasses to the shaven scalp. The quantity of blood to be taken must depend on circumstances. "From eight to sixteen ounces may be drawn, and the operation repeated as circumstances may require." When a stupid state has succeeded to one of high excitement, Dr. Haslam considers bleeding as contra-indicated.

But Dr. Rush is the most strenuous advocate for bleeding in maniacal cases. He lays the greatest stress on this remedy, and has perhaps carried its use to a greater extent than any other medical

practitioner of high repute. The arguments which he has given in support of the practice of large depletion in madness are the following:—1. The force and frequency of the pulse, the sleepless and agitated state of maniacal patients. 2. The appetite being unimpaired in lunatics, and sometimes even stronger than usual, a plethoric state of the vessels easily arises in such habits. 3. The importance of the diseased organ, the delicate structure of the brain, which prevents it from long supporting morbid action without being exposed to the danger of permanent disorganization. This danger, he says, is much increased by the want of sleep, the cries and exclamations, and the constant agitation of mad persons. 4. The want of any natural channel of discharge from the brain, by which the ordinary results of inflammation might be averted or got rid of, in that way by which serous discharges in other parts relieve the inflammatory state. 5. The accidental cures which have followed the loss of a large quantity of blood. Dr. Rush has seen several lunatics who had attempted self-destruction by cutting their throats, or opening the great vessels, cured by the abundant hemorrhages which have followed these attempts. 6. Lastly, he says that bleeding is indicated by the extraordinary success which has resulted from its use in the United States, and particularly at the hospital for lunatics in Pennsylvania.

Dr. Rush advises large bleeding at the first attack of mania. If the patient bears it without syncope, he ought to lose, according to this physician, from twenty to forty ounces of blood. If possible, it should be taken from him while standing erect. Free bloodlettings practised early in the disease have, as he says, a surprising effect in calming the patient, and in many instances are sufficient for the cure unaided by any other remedies. In most cases, however, bleeding from the arm is to be followed by the application of leeches or cupping-glasses to the head or nape of the neck, by low diet, antiphlogistic remedies, refrigerants applied to the head, and the use of warm or tepid baths.

Dr. Rush was of opinion that the evacuation of blood ought to be carried to a greater extent in madness than in any other acute disease whatever. From a patient, sixty-eight years of age, he caused two hundred ounces of blood to be drawn in less than two months. Another patient of Dr. Rush lost four hundred and seventy ounces by forty-seven bleedings in the course of seven months.

We shall conclude this survey of the conflicting opinions of practical writers on the expediency of bleeding in madness, by the following observations of M. Foville, which are deserving of the most attentive consideration, and which in our opinion place the subject in the true point of view. He says, "Without ever having pushed the employment of this remedy so far as Rush and Joseph Frank, I confess that it appears to me to be one of those on the efficacy of which the greatest reliance may be placed. MM. Pinel and Esquirol have proved that the 'expectant method,' assisted by a few simple rules, and a moral treatment wisely directed, have succeeded in a great many cases; but although it is better to confine ourselves to the use of simple means, patiently continued, than to employ unadvisedly the method of interference, I believe that the physician devoted to the study of pathological anatomy can draw from the results which it furnishes, compared with the observation of symptoms, valuable therapeutic inductions; that he may place reliance on their efficacy, and recommend them with confidence when experience shall have demonstrated their good effects. Are not the anatomical characters which so constantly present themselves in acute cases, and the adhesions which are so frequent in chronic ones, evident proofs of inflammation? And hence, are we not authorized to hope for advantages from the use of antiphlogistic means?

"If it be added," says M. Foville, "that in several hundred lunatics, whose bodies my situation for nearly ten years has given me an opportunity of examining, I have never found adhesions in acute cases, while they have been very common in chronic cases; if, with these facts, the results related in the works of MM. Bayle and Calmeil are compared, we may conclude, on seeing these adhesions so frequent in chronic cases, that they are incompatible with the regular exercise of an organ so delicate as the brain, and consequently incompatible with the return of reason. Hence we ought, in every acute case, to choose the most active means, in order to prevent this melancholy termination of the cerebral disease.

"Such are some of the reasons which have led me to agree with several physicians who have been placed in circumstances favourable for making observations, that bleedings ought not to be entirely proscribed in the treatment of mental diseases. In the greatest number of cases of recent insanity which have been placed under my care, I have employed evacuations of blood, local or general, rare or frequent, abundant or in moderation, according to the strength of the patient, and the state of the pulse, the redness of the eyes, the heat of the head, the agitation and want of sleep. I have always preferred general bleeding, when there existed a state of plethora, which the force and frequency of the pulse evinced. In opposite circumstances, leeches on the neck, the temples, behind the ears, cupping upon the same part, and upon the shaved head, have produced decided benefit. Local bleeding having appeared to me to produce a marked effect upon the brain, I have often prescribed it at the same time with a general bleeding in the case where the intensity of the general phenomena has imperiously demanded the latter; but I have never rested exclusively upon the efficacy of sanguineous evacuations, although in many cases I have seen all the morbid symptoms disappear, as if by enchantment, under their use.

"I have under my care several patients subject for a number of years to attacks of intermittent madness, which, left to nature, would last three or four months, or longer.

"During three years, that is, since they have been confided to my care, they have not experienced a single attack of a month's duration. Often in the space of five or six days all the symptoms have been dissipated. General or local bleedings proportioned to the intensity of the symptoms, warm baths with cold applications to the head at

the same time, are the means by which I have constantly averted the attack.

"I have several times prevented the return of these attacks by employing the same treatment, as soon as the redness of the eyes, the heat of the head, and wakefulness manifested themselves, even when there had been no delirium."

The writer of the present article having superintended during nearly twenty years a receptacle for maniacal paupers, has possessed adequate opportunity of forming an opinion on the ground of his own experience as to the efficacy of different remedies, and among other practical questions with reference to the treatment of insanity, as to the extent to which bloodletting is advisable in this disease. The results of his own observation lead him to doubt the propriety of the copious bloodlettings of which Dr. Rush is the advocate. He believes the cases of madness to be comparatively few, which can be cured at once by large depletions, and is sure that considerable danger to the existence of the patient would often be incurred if such a practice were generally pursued. At the same time he is equally convinced of the propriety of moderate detractions of blood, as advised by Cullen, Haslam, and Foville. This remedy ought by no means to be neglected in cases of madness which have come on rather suddenly and with acute symptoms, unless some circumstance in the age, habit, or temporary condition of the patient, renders it unsafe. It is especially called for in young and in plethoric subjects; when the disease is one of great excitement; when there is constant agitation and want of sleep, and in such cases it should be adopted before these causes have induced exhaustion and collapse; when there are marks of determination to the head, such as full and throbbing carotids and temporal arteries, redness of the face and conjunctiva, heat of the scalp, a contracted pupil, intolerance of light or of sound, headach, vertigo, startings, agitations, or convulsions. We are not to look for an aggregate of these symptoms before we prescribe bleeding, but more or fewer of them often occur to direct our proceedings. Less frequently we find the still stronger indications of which even M. Esquirol allows the force as pointing out the necessity of bleeding. We allude to the circumstance that the disease has arisen from the sudden suppression of catamenia or of some morbid but, perhaps, also salutary discharge, from the disappearance of eruptions, or from the operation of powerfully exciting causes. Among these is the abuse of stimulating liquors. Madness, which is the effect of intoxication, requires antiphlogistic remedies, and bleeding cannot be dispensed with; but care must be taken not to carry depletion too far in cases arising from this cause which assume in some degree the character of delirium tremens. We have reason to believe that patients labouring under delirium tremens have been killed almost instanter by large bleedings, which had been ordered by practitioners who were unaware of the nature of the case. This, however, is a form of disease easily distinguishable from ordinary madness resulting from intoxication. It is frequently advisable to bleed once or twice from the arm to the extent of fourteen or sixteen ounces, and afterwards, if the indicatory symptoms continue, to apply cupping-glasses to the scalp, after it has been shaved, and repeat this operation or the application of leeches as often as the degree of excitement and signs of vascular fulness, the circumstances of the patient otherwise admitting, seem to require.

Many practical writers have insisted on the necessity of bleeding in the early stage of madness, without adverting to the important advantages which are to be derived from the same remedy in the after periods of the disease. These, however, are highly important. The practice of bleeding to a small extent, either from the arm, or, what is commonly preferable, by cupping-glasses applied to the scalp or the nape of the neck, and repeating the operation in some instances periodically when the tenor of symptoms has been nearly uniform, or occasionally when the patient has been subject to fits of increased excitement, has appeared conducive to ultimate recovery in a great number of instances. When suppression of the catamenia or of hemorrhoidal evacuations has preceded the attack, cupping on the sacrum or the application of leeches to the hemorrhoidal vessels may perhaps best supply the defect of the natural or habitual method of relief.

The other resources, which are comprised under the antiphlogistic treatment of madness, will require a much less extensive consideration.

Shaving the head should always be done when there is much vascular excitement and heat about the scalp. By the coolness afforded on the removal of the hair, more benefit and a greater degree of tranquillization is often produced than is anticipated. Cutting the hair short is not sufficient: the head should be shaved once or twice a week.

Blisters, setons, caustics, irritants of various descriptions, have been applied to the head and the nape of the neck in cases of madness, as well as in other diseases of the brain.

While acute symptoms are present, with heat of the head and irritation of the general system, cold applications are preferable to blisters; but when these indications are not prominent, and when there is rather a tendency to stupor than excitement, blisters on the head are frequently of service. They have been applied in most cases to the nape of the neck with some advantage, particularly when, as it has often happened, the discharge which follows their application has been very considerable.

M. Esquirol has remarked that blisters, cuppings, and other irritating applications, are used successfully in cases which follow a metastasis; in monomania accompanied by stupor; in puerperal madness; and in dementia when not complicated with convulsions or paralysis.

Issues and setons in the neck have been often tried, but the general result of experience is not favourable to their use. They afford little benefit in maniacal cases. In dementia connected with paralytic affections, they are more likely to be of service than in mania attended with excitement. In the ordinary chronic state of madness, these remedies are found to be rather injurious than beneficial.

Irritating ointments have been applied in many instances, particularly since their use was strongly recommended by the late Dr. Jenner. Medical

practitioners have been generally disappointed in their expectation of benefit from this attempt. It is most likely to be successful, as hinted by M. Esquirol, in cases of metastasis.

[It may be borne in mind, however, as a remarkable fact, that in the Gloucester Lunatic Asylum, England, which is under the superintendence of Dr. Shute and Mr. Hitch, the use of the lancet, leeches, cupping-glasses, blisters, drastic purgatives, and the practice of shaving the head are totally proscribed, and yet recoveries take place in a large proportion, and no cases of sudden apoplexy or hemiplegia have occurred. The practice of making an incision through the scalp, over the sagittal suture, with the view of establishing steady counter-irritation, has been employed for some years past by Dr. C. Evans, physician to the Frankford Insane Asylum, near Philadelphia, in the treatment of chronic affections of the brain; and, it is said, with very satisfactory results. The actual cautery and the *Pommade ammoniacale* of Gondret have likewise been applied with advantage. (See COUNTER-IRRITATION.)]

Cold Water and Bathing.—Cold shower-baths, and affusions of cold water administered in various methods, have been extensively tried in maniacal diseases. Dr. Rush considered them to constitute a very important remedy, and recommended, in order to obtain the greatest advantage from them, that they should be repeated two or three times in a day. M. Esquirol used this remedy with advantage in some cases; he chiefly prescribed it for young subjects. M. Foville says that he was a witness to an almost immediate cure of a maniacal girl of delicate constitution and nervous temperament, who was subjected by M. Esquirol to the affusion of cold water at the degree fourteen of the centigrade thermometer. She was placed, with a garment covering her, in an empty bathing-tub, and water was poured in small quantities on her head till it covered her body, and shivering ensued. On a second application of this method, which was for some time resisted, it was followed by deep sleep, accompanied by copious sweating; and when the patient awoke, she was found to have recovered her reason.

The method of bathing adopted by M. Foville in the hospital under his management is free from the inconveniences and occasionally injurious results attendant on cold affusions. He places a cap or bonnet, containing ice and closely fitting, on the head of the patient, and keeps the body immersed in a warm-bath for two or three hours, and renews this proceeding twice or three times in a day, according to the intensity of symptoms. On adopting it, as he was accustomed to do at first, only once in a day, he found the tranquillity produced by it followed not unfrequently by increased agitation; but on repeating the bath, with the ice constantly applied to the head, he has frequently succeeded far beyond his expectation. It has been the apparent means of recovery in many acute cases, and has produced sleep and tranquillity in frequent instances of obstinate restlessness and agitation.

The use of the shower-bath is often followed by re-action, when the patient, if excitable, becomes violent. In old cases, attended with a disposition to congestion of blood in the head, its use is precluded by the danger of producing paralysis. It is chiefly serviceable in young subjects; when the constitution is relaxed, and when it is predisposed to hysteric affections.

Applications of ice, or, when more convenient, of cold water, are very generally serviceable in cases attended with heat of the head and irritability.

Warm or tepid bathing has been found advantageous in the treatment of madness under a variety of circumstances. A cold state of the skin, languor of the general circulation, indicated by coldness of the extremities, a tendency to chronic eruptions, are among the phenomena which suggest its adoption. Sometimes it produces sleep after long-continued agitation. If the degree of heat be not such as to produce too much vascular excitement, it is generally an useful and safely applicable remedy.

Purgatives.—No fact in medical practice has been longer established than the utility of purgatives in madness; witness the fame of Anticyra and hellebore. To confirm a maxim so well supported by the result of constant experience, it seems almost superfluous to adduce pathological facts. It is not, however, difficult to find this species of evidence in its favour. Many authors have remarked that spontaneous cure of madness has resulted from a supervening diarrhœa, in which the intestines have discharged in great quantities a variety of morbid secretions.

M. Esquirol has well observed that purgative medicines ought not to be used indiscriminately in all cases of madness, and that they are injurious when the mucous membrane of the intestinal canal is in a diseased state. This is the case in many instances of insanity. We shall, under another indication for medical treatment, consider the method of practice which is advisable in different states of intestinal irritation, as they occur in madness. At present it will be sufficient to observe that, unless any signs of disease exist in the structure of the alimentary canal, such as inflammation or ulceration of the mucous coat of the intestines, the use of purgative medicines is one of the most important and generally available means for the cure of maniacal patients. The mildest cathartics are preferable to others in most instances, because their use can be long continued without injury to the structures on which they immediately act. The neutral salts, infusion of senna, rhubarb, jalap, castor oil, are in the majority of cases sufficiently powerful, and may be used daily or frequently according to circumstances. When there is decided tendency to constipation or the alvine evacuations are morbid, calomel scammony, colocynth, or croton oil, may be added due attention being paid to the cautionary circumstance above pointed out.

Emetics.—Emetics have been strongly recommended by some practical writers. M. Esquirol says that he has found them useful in most cases of melancholy accompanied by a torpid state of the system. Dr. Rush considered them to be chiefly indicated in hypochondriasis, or lowness of spirits connected with dyspeptic disease. Haslam confirms their utility in cases attended with disorder of the stomach, merely with a view to the relief of that particular symptom, but he de-

clares that, "after the administration of *many thousand* emetics to persons who were insane, *but otherwise in good health*, he never saw any benefit derived from their use." "Perhaps no one," he says, "has enjoyed a fairer opportunity of witnessing the effects of remedies for insane persons than myself; and when emetics are employed in Bethlem Hospital, they have the best chance of effecting all the relief they are competent to afford, as they are given by themselves, without the intervention of other medicines; and this course of emetics usually continues six weeks." "It has been for many years the practice of Bethlem Hospital to administer to the curable patients four or five emetics in the spring of the year; but on consulting my book of cases, I have not found that such patients have been particularly benefited by the use of this remedy. When the tartarized antimony given with this intention operated as a purgative, it generally produced beneficial effects." The most strenuous advocate, in late times, for emetics in madness is Dr. Cox, whose work on that disease contains many excellent practical observations. This author goes so far as to say, that, "in almost every species and degree of maniacal complaints, from the slightest aberration of intellect that accompanies hypochondriasis, to the extreme of mania furibunda, emetics have proved a most valuable and efficacious remedy." Dr. Wake, physician to the York Lunatic Asylum, has assured the writer of this article, that, after extensive experience in the use of different remedies on the patients of that hospital, he has found no other class of remedies so frequently efficacious as emetics.

The use of emetics in madness requires caution. Dr. Haslam says, that, "in many instances, and in some where bloodletting had been previously employed, paralytic affections have within a few hours supervened on the exhibition of an emetic, more especially where the patient has been of a full habit, and has had the appearance of an increased determination to the head." As it is well established that lunatics are very subject to attacks of apoplexy and paralysis, this circumstance ought always to be taken into consideration in the prescribing of emetics to maniacal patients. The use of medicines of this class is precluded by the signs of a plethoric habit and cerebral congestion; but, as MM. Esquirol and Foville have well observed, they are likely to be of service, and this probability is confirmed by ample experience, in cases of melancholy or hypochondriacal dejection attended with stupor, and where the languid state of the functions, both animal and physical, appears to require the use of remedies which are fitted to excite new actions, and to stimulate the secretions of the abdominal viscera. It may be added that emetics are sometimes useful during a state of furious excitement, and produce calmness and a mitigation of violence. Sometimes under these circumstances their exhibition is followed by a restoration of sleep and tranquillity.

Maniacal patients often require large doses of tartarised antimony, as from six to ten grains, before vomiting is excited; and this is especially the case when the remedy is given during a paroxysm of violent excitement. It is, however, better to begin with moderate doses, and to combine ipecacuanha with the preparation of antimony.

The use of antimony in nauseating doses is always safe, and very frequently beneficial in controlling maniacal excitement and the febrile state of the system which accompanies it.

Rotation.—The use of a rotary swing, which occasions vertigo and nausea, and if continued a sufficient time, brings on vomiting with some degree of faintness, was suggested, chiefly from a theoretical notion, by Dr. Darwin. The beneficial effects of this remedy have been supported on the ground of experience by Dr. Cox. Some writers have ridiculed the idea of attempting such a remedy, and others have thought it difficult to imagine on what principle it can be of any service; but those practitioners who have put the proposal to the test of experiment have, if we are not mistaken, in most instances been convinced of its utility. Among these may be mentioned Dr. Wake of York, who has assured us that he has long considered the rotatory swing as a remedy of great efficacy. It was used by Dr. Cox in cases of violent maniacal excitement, and proved a powerful sedative. The nausea and sickness induced were found to quiet the patient and put a speedy termination to the paroxysm. It was not requisite in all cases to bring on vomiting. Quiet sleep often followed the use of this remedy.

The rotatory swing is also useful as a means of moral restraint. The effects are so disagreeable that the threat of repeating its use has a salutary influence upon turbulent and intractable patients.

2. *Second Indication.*—The principle of medical treatment hitherto considered, which has respect to the physical condition of the brain in cases of maniacal disease, is chiefly applicable to the acute stage and early period of its duration. The pathological fact on which it in part is founded, may be usefully borne in mind in the subsequent progress of the complaint, and acted upon more or less when circumstances allow or require it; but it cannot, when the disorder has become confirmed, be the chief guide of the practitioner. The marks of determination to the head have generally, under such circumstances, in a great measure subsided. In these instances inflammatory action in the brain has probably given way to a state of relaxation bordering on serous effusion, or to other changes which imply rather the consequences than the existence of increased vascular action.

The second indication for the medical treatment of insanity, which has relation chiefly to the more advanced period and chronic aspect of such disease, is to restore and maintain, as far as it can be done, a healthy condition of the physical or natural functions, to obviate or remove disorders in other parts of the system, which may be connected or coincident with the diseased condition of the brain.

We have already observed that in a great proportion of maniacal cases there are symptoms of disturbance in the natural functions, and that diseases of the thoracic and abdominal viscera coexist with that morbid state of the brain on which madness immediately depends;—that the former

are in fact often the immediate causes of death. The relation in which these diseases stand to the cerebral disorder may be doubtful in many instances; in some it is the relation of cause, in others that of effect: even in the last instance there is a reaction of the secondary upon the primary parts in the series of morbid changes, and the original disease is aggravated by its complication with an accessory one. By relieving the latter we obtain a proportional mitigation of the former. It is indeed a fact that many lunaties have been cured by a course of remedies adapted to the restoration of their general health. The writer of this article has often seen persons who had laboured for some months, or even years, under mental derangement, brought from poor-houses in the country, or from their private dwellings, in a state of emaciation and squalid wretchedness, suffering under various disorders which had become complicated with insanity, or had in some instances preceded it. These persons have been placed under medical treatment; care has been taken to relieve the symptoms of visceral disorder, to restore the functions to a healthy state, to afford them good and nutritious diet, and to remove complaints which occurred from time to time by occasional remedies. In many cases of this description, as the general health improved, the mental disorder has gradually lessened, and has finally disappeared. In the course of four, five, or six months from the period of their coming under medical treatment, very many patients of this description have been restored to their usual state of health, and to the exercise of their customary occupations, after having undergone the operation of few remedies except such as are adapted to the indication or principle of practice now pointed out.

The mode of treatment required in following this indication must vary according to the state of the constitution and the modifications of disease which particular cases may present.

In examples of madness complicated with intestinal disorder, care must be taken to relieve the latter by the various remedies and modes of diet and regimen which the disorder of the intestinal canal and its functions requires. A torpid state of bowels must be overcome by the use of mild aperients, continued daily, or given occasionally according to circumstances. When constipation has given way to diarrhœa, with tenderness, abdominal distension, with or without occasional symptoms of dysentery, with emaciation, coldness of the skin, general debility, a disposition to eruptions resembling those of scurvy or purpura, the cure can only be promoted by a careful attention to a variety of particulars. The action of the bowels should be restrained by absorbent medicines, combined with slight opiates and mercurial alteratives. The use of the warm bath, warm clothing, and a warm atmosphere, a mild and nutritious diet, should be enjoined at the same time. Bitters, vegetable tonics, and aromatics may be given to support the strength of the stomach and promote digestion: a liberal allowance of animal food, and sometimes malt liquors, and even a little wine are used with advantage in cases of debility and exhaustion when the digestive powers will bear their use.

When the actions of the intestinal canal are irregular in chronic cases of madness, without giving rise to so great a degree of disease as in the instances above indicated, a healthy state of their function is sufficiently promoted by giving mild aperients, with bitter and neutral salts, two or three times in a week, and occasional doses of calomel.

When madness has been the result of, or has been accompanied by, diminution or loss of any other natural function or habitual process, an effort should be made to restore it. If we were possessed of any certain emmenagogue, it is highly probable that its successful application would in many cases promote the cure of maniacal diseases connected with the suppression of the catamenia. When habitual discharges from the hemorrhoidal veins have been coerced, or have ceased spontaneously, derangement of the health has ensued similar to that occasioned by uterine suppressions. The want of this latter process seems to be more easily supplied by the powers of art than that of the uterine function. M. Foville has mentioned a case which occurred to M. Esquirol, in which paralysis became complicated with madness in consequence of the suppression of an habitual hemorrhoidal discharge. The application of a single leech to the hemorrhoidal veins every day during a month was followed by a restoration of the flux, and the patient was cured of his complaint.

Attempts to restore the catamenia when defective in maniacal patients, as they very frequently are, seldom produce in a speedy manner the desired result. If any effort is perceptible at particular times to set up the periodical discharge, it should be promoted by small bleedings; by the application of leeches to the inguinal region of the thighs, or by cupping at the loins, together with the use of the hip-bath, pediluvium, general warmth of clothing and atmosphere, warm drinks, with doses of castor, camphor, and other odorous stimulants. At other times aloë, rhubarb, and aromatic bitters should be given daily by way of preparation.

Digitalis has been reckoned by some practitioners, particularly in Germany, as almost a specific in maniacal cases. Dr. Cox speaks favourably of its effects. By M. Foville its use is very judiciously limited to those instances in which disorder of the brain is coincident with, and, as he supposes, dependent upon disease, or at least increased action of the heart, and particularly increased fulness and pulsation of the carotid and temporal arteries.

Opium and narcotics are *generally* injurious in madness. Their use is condemned by most practical writers. Occasionally, however, opium has been of decided benefit. Dr. Hodgkin has witnessed two cases of madness with a strong propensity to suicide, in both of which a strong dose of opium procured sound sleep, followed by a restoration of health. The use of opium requires great caution in maniacal diseases. No precise rules are determined by which we can judge of the propriety of its use.

[In large doses, it is strongly advised by some practitioners, as by Drs. Brigham and Woodward. The writer has administered it in the long protracted sleeplessness of insanity, and often with

decided benefit; but it requires to be given in large doses, at least two and a half or three grains, in the form of pill; and the dose may be repeated should it be necessary.]

The use of mercury has been highly recommended in madness by several writers, and particularly by Dr. Rush. Mercury is by no means a general remedy for maniacal diseases; but in cases of torpor, with suppression or a very scanty state of any of the secretions, mercury is frequently employed with great advantage. It should be used in mild alterative doses, and discontinued as soon as the gums become slightly affected.

Attention to diet and regimen is fully as important for the fulfilment of the last-mentioned indication as any remedy whatever. In exhausted subjects, as before hinted, great advantage is obtained from the use of a liberal diet. A plentiful allowance of animal food of the most wholesome and digestible kind, with malt liquor, and in some instances a small portion of wine, is required. The adoption of a liberal diet is not only free in such cases from any exciting or too stimulant influence, but even appears to calm the irritation which previously existed. But no rule respecting diet can be laid down that must not be subject to modification in particular circumstances, and according to the peculiarity of the case and the state of the constitution.

Fresh air and exercise, for those patients who are in a condition that renders them fit for it, are among the most important restorative means.—Every asylum for the reception of lunatics ought to be provided with the means of affording regular employment in the open air to all the patients who are able to undertake it. Gardening and various agricultural works should as much as possible occupy their time at stated periods of the day, and by system and judicious management a great majority among the inmates of these receptacles may be brought into the habit of devoting themselves mechanically to such employments. M. Esquirol remarks that the best effects have resulted from the employment of these methods. They are followed with the greatest advantage in several lunatic asylums, both public and private, in different parts of England.

Of the moral treatment of Insanity.—We now proceed to the second division of the subject under consideration, viz. to the moral treatment of insanity.

The moral treatment of this disease has by many writers been made to include a variety of methods proposed with the hope of inducing, by an unexpected and powerful influence on the feelings of deranged persons, a salutary change in the state of their minds. These are either motives addressed to their passions, or a variety of ingenious schemes or stratagems for convincing them of the falsity of their hallucinations, and surprising them into a recognition of their erroneous impressions. It has been proposed to indulge the illusions of the insane to a certain degree in order to overcome their false notions by striking and undeniable proofs. We are told that a lunatic who fancied that he had a serpent in his stomach, was cured by giving him an emetic, and adroitly producing a reptile as if it had been thrown up during the operation of the medicine. Even such writers as M. Pinel and M. Esquirol, otherwise so enlightened and so judicious, appear to lay some stress on attempts of this description. The latter had a patient who fancied that she had a little animal in her head: her physician encouraged the idea, and proposed an operation; an incision was made on the scalp, and an insect produced: the patient was immediately cured. A lunatic mentioned by the same writer refused to eat; he had made a vow, and was bound in honour to abstain from food. After many days employed in the attempt to persuade him of his mistake, a pretended order was brought, signed by his sovereign, which commanded him to break through his resolution, and promised him a guarantee against any reproach on that account: after a moral struggle of some hours, he gave way with reluctance, took food, and was restored. Another individual, who had become insane in consequence of the political events of 1813, was informed of the revolution which occurred in the following year. He refused to believe. M. Esquirol led him into the midst of the foreign troops which surrounded Paris. He was convinced, and almost immediately cured.

It is barely within the sphere of possibility that a conjuncture may occur in the treatment of an insane person, when an attempt may be advisable to destroy his hallucination by some practical and striking proof; but, generally, attempts to convince lunatics that their impressions are false, and that they labour under mental disease, either by reasoning or by any contrivances, are abortive, if not injurious. The moral treatment which such cases actually require is of a very different kind.

The most important question which relates to the moral treatment of the insane turns upon the propriety of secluding them, and separating them from their families and from society. This is a subject which of late has excited much attention and serious consideration, both among medical practitioners and other persons in England. It has likewise been examined in every point of view by writers of just celebrity on the continent; M. Esquirol and M. Georget in particular have considered this subject in all its bearings, and have expressed their sentiments upon it with great perspicuity and soundness of judgment. We shall avoid all suspicion of prejudice or erroneous bias by citing the observations of these writers, whose authority will carry greater weight than that of most other individuals, removed as they have been from the influence of circumstances which have given rise to controversy and unreasonable varieties of opinion.

"The first question," says M. Esquirol, "that presents itself in connection with the moral treatment of lunatics, relates to their separation. Ought every insane person to be withdrawn from his accustomed habits, from his usual manner of living, separated from the persons with whom he habitually lives, to be removed into a place which is unknown to him, and confided to the care of strangers? All physicians, English, French, and German, agree upon the necessity and utility of separation. Willis, to whom we have so long and with so much advantage resorted in England to obtain a cure in cases of insanity, has remarked that strangers were restored much more often than the English. We can make a parallel observation

in France. Cures are more frequent among the invalids who come to Paris to be treated there, than among those who reside in the capital. The latter have not been sufficiently isolated.

"The first effect of separation is to produce new sensations, by presenting new objects, and breaking the train of ideas which has laid hold on the mind; these new objects strike, arrest, and excite the attention of the lunatic, and he becomes more accessible to advice which may be the means of restoring him to reason. Thus the first moment in which a maniac is separated from his friends is always followed by a remission of the complaint, which is important for his physician, who, then finding the patient without prepossession, can more easily acquire his confidence.

"It is principally upon the disorder of the moral affections that the necessity of separation depends.

"The disturbed state, the exaltation of ideas of the insane patient, puts him in contradiction not only with those who live with him but even with himself. He persuades himself that his friends are determined to oppose him, because they do not agree with his excesses and extravagances. Not understanding what is said to him, he is impatient; generally he misinterprets the words that are addressed to him; proofs of the most tender affection are taken for reproaches, or for enigmas that he cannot understand; the most anxious cares are only intended to vex him; his heart cherishes only sentiments of defiance; he becomes timid and gloomy; he fears every one who approaches him; his suspicions extend to persons who had been most dear to him. The conviction that every person is intent upon opposing him, defaming him, rendering him miserable, destroying and ruining him, puts a completing stroke to this moral perversion." Thence arises that "symptomatic suspicion which increases under indispensable contradictions, which augments in strength as the intellectual faculties weaken, and which is painted so strongly upon the physiognomy of all insane patients."

"With these moral dispositions, if you leave an insane person in the midst of his family, the affectionate son, whose happiness consists in the society of his father, will soon desert the paternal roof. The despairing lover believes that he can, by his councils, bring back the wandering reason of her to whom he is devoted; he has the misfortune only to render the wound still deeper. The object of his affection soon sees in him only a perfidious traitor, who affects such eager anxiety the more easily to betray her. The tender and sincere friend hopes by affectionate cares to restore that sensibility and that reason which have been the source of his attachment and happiness. In a short time he will find himself included in the general proscription, and his cares will only appear to the afflicted person proofs that he has been corrupted by enemies. What hope can we entertain if we do not immediately change the situation of these unfortunate persons, who are so strongly prepossessed? And who has not felt the difference that there is in being deceived, opposed, and betrayed by our nearest relations and friends, and by individuals who are altogether strangers and indifferent to us? Another unhappy person becomes, all at once, lord of the world, dictates his sovereign commands to all that surround him; he persuades himself that he is blindly obeyed by all those who have been accustomed to yield to his will through respect or affection. His wife, his children, his friends, his servants, are his subjects; they are all obedient, for how dare they be otherwise? He is in his own territory; his commands are despotic; he is ready to punish with the greatest severity whoever shall dare to make the least remonstrance. What he requires may be impossible—it is of no consequence: should the commands of the potentates of the earth meet with invincible obstacles? The affliction of his family, the chagrin of his friends, the anxiety of all, their deference to his will and caprices, the repugnance that each evinces to oppose him from the fear of exasperating his fury,—all contribute to confirm him in his silent possession of power and dominion. Withdraw him from his pretensions, transport him far from his house, from his empire,—removed from his subjects, surrounded by new scenes, he will collect his ideas, direct his attention to himself, and place himself on an equality with his companions.

"Very often the cause of mental derangement is to be found in domestic causes. The malady takes its rise from chagrins, from family dissensions, from reverses of fortune, from privations, &c.; and the presence of relations and friends increases the evil, often without their suspecting that they are the first cause of it. Sometimes an excess of tenderness seizes the patient; a husband persuades himself that he cannot make his wife happy; he forms the resolution of flying from her, and threatens to put an end to his existence, since it would be the only means of securing her happiness. Her tears, her melancholy countenance, are so many new reasons for persuading this unfortunate person that he can do nothing better than commit suicide.

"Sometimes the first commotion given to the moral and intellectual faculties has arisen in the home of the insane person, in the midst of his relations and friends. All these external circumstances being associated with the first attack and the disorder which followed, will often contribute to keep alive and foster the hallucination,—a phenomenon which easily explains itself, since ideas recur simultaneously with certain impressions, when these impressions and ideas have often been associated, or even when they have been connected, only once, but with remarkable force and energy. It is generally remarked that insane people feel an aversion towards certain individuals, without the possibility of diverting them from this feeling. The object of their hatred is almost invariably the person who before the attack possessed their tenderest affection; hence it is that they are so indifferent to their relations, and oftentimes so dangerous; while, on the other hand, strangers are agreeable to them. The presence of strangers suspends the delirium of the insane, either by the influence of new impressions, which is always useful, or from a secret feeling of self-love, which induces lunatics to conceal their state of mind. I have seen patients appear quite calm before their physician and strangers, while they were at the same time abusing their relations or their friends in an under voice.

"Such are the obstacles and inconveniences that present themselves when patients are put under medical treatment, if they continue to live with their families; and such are the advantages that will accrue from their being placed in a house appropriated to their treatment, where they are surrounded by new circumstances and confided to the care of strangers.

"Under what circumstances ought they to be confined? We have already said that they ought to be placed in a house appropriated for the treatment of insane persons. We prefer such a house to a private one, where patients may be confined at a great expense. Such partial separations rarely succeed: they possess many of the inconveniences which it is desired to avoid in leaving patients in their own habitations, and they present very few of the advantages of a house destined to receive a number of individuals. The strongest objection against separation or the placing patients in a lunatic asylum, arises from the distress which it is feared the patient will suffer when he observes that he is surrounded by companions in affliction. I reply that, generally, this does no injury to the patient, that it is not an obstacle to the cure, and that it oftentimes contributes to promote recovery. It leads maniacal persons to reflect upon their own state; and while ordinary objects make no impression upon them, they are diverted by the extravagances of their associates. The presence of their companions may serve as a text to the practitioner who wishes to act upon their imagination. The weariness of confinement, the desire of being at liberty, the wish of seeing their relations and friends, are so many means of drawing their attention outwardly: to be occupied with what passes around them, and in some manner to forget themselves, is a step towards recovery. However, there are cases where separation, as all other useful things, may be injurious to patients, when it is not modified with reference to the susceptibility of the individual, the character of his delirium, his passions, his habits, his manner of living. We ought never to lay down absolute rules in practice; the art consists in skilfully discriminating the circumstances which ought to modify general principles, whatever confirmation they may have derived from experience."

The preceding observations of M. Esquirol have been confirmed, and in some particulars more strongly stated, by the late M. Georget. This intelligent writer has remarked that all physicians who have habitually the care of lunatics have recommended the seclusion of these invalids, in almost every case, as the first condition, and one of the first means in their treatment. "Lunatics," he says, "ought to be separated from the objects which have excited their disease, or which foster or aggravate it; from relatives or servants whom they dislike, whom they pretend to command, and to whom they will never submit; from busybodies, who only irritate them by useless arguments or misplaced ridicule: they ought to be separated from society, and placed in an appropriate habitation, to ensure both the safety of the public and their own preservation. Their friends are always repugnant to put this plan into execution: a mother, a wife, or a husband, can with difficulty believe that the object dearest in the world to either of them can be better placed in the hands of strangers than under the influence of those who are eager to devote the most affectionate cares; they fear likewise that in lunatic asylums the sight of the patients will have a bad effect upon their friend, and aggravate the disease; that constraint, severity, and all kinds of bad treatment will be employed to manage the patients, and, if once cured, they will preserve a horrible impression of their abode, and resentment against their relations who have consented to their confinement. These last considerations induce rich families to place their deranged relatives in private houses destined to receive a single lunatic, who is surrounded by servants and inspectors whom he does not know. Besides that these private establishments are very expensive, they rarely answer the end proposed; either some relation chooses to remain near the invalid, or the latter soon perceives that every thing by which he is surrounded is destined for his service; in either case the objects of seclusion are imperfectly attained. Lastly, many things are often required which are only to be found in public establishments. This imperfect separation, however, is all that can be adopted in some families, and we must make as much advantage of it as we can. In public asylums the seclusion is complete; the patients soon know that they are under the authority and even at the discretion of the director; they are watched and constrained without difficulty, under the care of regular attendants. They find powerful sources of occupation and of distraction in associating even with the other patients. The greater number of lunatics never discover that they are in the midst of mad people, and find nothing to complain of in this circumstance. When their reason begins to return, they are removed into the apartment destined for the reception of convalescents, and hence are withdrawn from sights which might make unpleasant impressions upon them. As long as the disease continues, they are angry with those who have deprived them of their liberty; but as soon as they have recovered their reason, resentment is changed into gratitude. On this account, then, the friends of the insane incur no risk. We do not pretend to deny that this separation and abode among other lunatics has occasionally aggravated the disease, when of recent occurrence, in some individuals: on the other hand, we affirm that the same means have cured many lunatics almost immediately. Besides it is next to impossible to preserve and take care of maniacs or monomaniacs in the midst of their family, and all the inconveniences of separation disappear under the absolute necessity of its use."

The same writer has briefly summed up the principal circumstances to which attention ought to be paid in the construction or choice and in the management of an asylum or house of recovery for lunatics. He has collected these remarks from the writings of Pinel and Esquirol.

"1. M. Pinel has particularly insisted upon the necessity of classing lunatics, of separating such as are liable to injure themselves or others, and permitting those to associate together who may contribute to each other's cure. A lunatic asylum ought, then, to be composed of several parts more or less insulated. There should be a quarter ap-

propriated for each sex, a division for violent lunatics, a second for those that are tranquil, a third for convalescents, a fourth for lunatics who labour under accidental disorders. It will be very useful to have a division for those who are of melancholy habits, and in a state of dementia, and another for furious and noisy patients, and for some lunatics who are of an untameable character, and are confined by way of punishment. It is above all things necessary to separate the sexes, the convalescents, and likewise those patients who have depraved habits and indecent manners. Each division ought to have a court planted with trees, and, if possible, a garden for the patients to walk in.

"2. M. Esquirol, who has devoted his attention to the arrangements which these establishments require for the convenience of the patients, to facilitate vigilant superintendence and attention, and to prevent accidents, is of opinion that such houses should be built on level ground; that the cells destined for violent patients should be spacious, with a door and window opposite each other, and opening from without; that they should be boarded and not paved, furnished with a bed, firmly fixed in the wall; that all the cells should communicate with covered galleries or corridors, in which the patients may walk in bad weather, and by means of which the inspectors and servants may easily traverse the different parts of the establishment; that all the rooms should be warmed by pipes of hot air; that abundance of water should be furnished by fountains to wash the dirty cells; that the privies should be separated in such a manner as to occasion no inconvenience to the patients; that there should be places appointed for a general work-room, for a common dining-room, for baths and shower-baths. In this plan of M. Esquirol's there are dormitories only for convalescents, melancholy patients, idiots, and individuals who are debilitated. For others little cells with one bed are preferable, in almost every case; during the day the patients can go out and associate with others, and in the night they do not require companions.

"3. Beings deprived of reason, who fancy themselves reasonable, who incessantly desire and demand things that cannot be granted them, and who are nevertheless sensible to kind as well as to bad treatment, must needs be difficult to influence, to govern, and to cure. As long as each person continues insane, he looks upon the director and inspectors of the establishment as accomplices in the power which has deprived him of liberty, and upon the attendants as inhuman jailors. Even after his cure he is not always very grateful. The director, the inspector, and the attendants, will invariably be objects of prejudice, suspicion, and hatred to the patients; they will receive abuse and often blows from them. On the other hand, it is impossible for one who has not had for a long time the care of them, and studied their disease, to know the mental disposition of lunatics. Without such preparation we should attribute to wickedness what is the effect of disease, or look upon lunatics as beings deprived of all sensibility. In either case we might be induced to treat them with severity. It is almost impossible to make servants understand that mad persons have the use of some of their faculties, with the exception of those servants who have been themselves attacked by the disease. At the Salpêtrière and the Bicêtre great advantage is derived from employing persons who have been cured to take care of the patients. The physician of a lunatic asylum ought to be particularly careful to instruct the individuals who are to have the management of the patients.

"4. It is absolutely necessary that a judicious arrangement of authority and subordination be established in lunatic asylums, and that the physician be invested with a power superior to all with regard to every thing that concerns the patients."

The chief points on which the moral cure of madness turns are thus summed up by M. Georget.

"We may refer to three principal heads all the regulations that can be put in practice with reference to the discipline and exercise of the mental powers in lunatics. 1. Never to excite the ideas and passions of the patients upon the subject of their delirium. 2. Never directly to oppose their unreasonable ideas and opinions, either by argument, discussion, opposition, contradiction, or ridicule. 3. To fix their attention upon subjects foreign to their hallucination, and communicate to their minds new ideas and affections by means of different impressions.

"According to the first principle, we should withdraw the patient from the causes which have excited his madness, and even from objects which might recall these causes, or suggest any allusion to them. Lunatics attacked with religious melancholy should be deprived of their books of devotion; they should not be permitted to engage in offices of religion. Those who are tormented with sexual desires render these desires more imperious by gratifying them, if they do not destroy their health. We ought never to flatter the chimeras of kings, of princes, of gods, of queens. We should never put the patients attacked with the same kind of insanity together, because they would talk incessantly of their conceits, and thus cause to each other a great deal of injury. Thus, as in other diseases, we ought to leave the over-excited part at rest.

"According to the second rule, we should never attempt to reason with lunatics in order to bring them to their senses, for their errors are necessarily connected with their disease. The most evident proofs are of no weight upon the mind of a lunatic. He will suspect that there are secret reasons for deceiving him. Discussion, opposition, contradiction, irritates the disease, and inspires defiance and hatred. In accordance with the third rule, we should make it a point to occupy the mind, and to direct it by different means, such as exercise, work, play, the society of other patients, sane persons presiding over them; by music, reading, conversation, the visits of friends, &c. We should oppose one passion to the ruling passion, and on some occasions excite the activity of feeling by strong emotions, by means of fear, or the sudden announcement of bad news. But these different means are applicable neither in every case nor at every period of the disease. It is in general very difficult to turn for any length

of time the attention of the patients from the subject of their delirium; it is above all things difficult to engage them in occupations either of work or amusement. Very often the disorder of their minds is such that they are continually under the influence of their delirium; they exist in their illusions, and their attention is hardly arrested by the objects that surround them. Restoration to their friends should never take place until the convalescence of patients is perfectly established, and even then great precautions must be used to manage the first interview, to prepare the mind of the patient and of the relatives, and to fix the subject and length of their conversation.

"An active and constant inspection exercised over the patients and the attendants is very necessary in a lunatic asylum. Patients who evince a disposition to suicide should never be lost sight of for a single instant, whatever they may say or do to obtain their wish. It is often necessary to confine violent patients with the strait-waistcoat. Those who are addicted to indecent practices,—a circumstance by no means infrequent,—should be restrained by similar means. Occasionally it is better to confine them by shackles on the legs, fastened down in an arm-chair, or shut up in their rooms, according to circumstances. The use of chains is almost entirely abandoned, and we are indebted to the noble efforts of our venerable Pinel for this improvement in the lot of lunatics." (It may be observed that M. Foville ascribes to the Quakers who have managed the "Retreat" the credit of having been the first to discard these inhuman instruments of restraint.) "At the time of the abolition of chains at Bicêtre, M. Pinel observed that the diminution of the number of furious lunatics, and the accidents which they occasioned, was very remarkable. The only measures of punishment that ought to be put into practice are the strait-waistcoat, seclusion in a cell, removal from one division to another, the shower-bath, and some occasional privations. A violent or wicked lunatic, who all at once puts on a menacing appearance, or even commits reprehensible actions, should be immediately surrounded by a number of attendants, approached and seized at the same time on all sides, particularly by those who are behind him. Sometimes great advantage has been found by suddenly enveloping the patient's head in a napkin, which completely bewilders him. In other cases, while persons placed before the patient endeavour to occupy his attention, others advancing from behind easily lay hold of and secure him.

[Of late, it has been proposed, and practised, to abolish totally all personal restraint in the management of the insane; and the course is said to have been entirely effective. The plan is to substitute a rigid system of constant superintendence, of well-preserved classification, and of humane and effective practical management. It has been affirmed, indeed, that in a properly constructed building, with a sufficient number of suitable attendants, "restraint is never necessary, never justifiable, and always injurious in all cases of lunacy whatever." Cases, in which the patients render their clothes and persons filthy, present considerable difficulty, but a warm bath is always ready, into which the patient is put, and well washed, and the clothes are changed as often as becomes necessary. In violent cases, the patient is at times placed alone in a room, well aired and lighted, where there is nothing destructible, and is treated with all the kindness that can be bestowed upon him. If we admit, however, the practicability and efficiency of the system of non-restraint in a large mass of cases, it may be questionable, whether it be of universal application; and were it so, it can rarely happen that establishments for the insane are so well provided with competent attendants, that corporeal restraint can be wholly dispensed with. The experience, however, of the large insane establishments of this country, has sufficiently shown that it can be but seldom necessary.

By a proper classification of the insane, it will be found that there are comparatively few who are incapable of participating in labour or amusement. Every well-devised insane asylum ought, therefore, to be able to employ such of the patients as are fitted for the task in agricultural or horticultural labours; workshops should be provided, and employment of some kind or other be carefully adapted to each individual. The attention, which such occupations require, produces a moral revulsion, and prevents the topic of hallucination from recurring, or, should it recur, from wholly engrossing the mind of the lunatic. This is now so well understood, that in the different insane establishments it is an object of solicitude on the part of the medical superintendent; and the results have been most salutary. The reports of these institutions sufficiently testify to the interesting fact, that however perverted may be the reasoning powers, there are but few who are unsusceptible of appropriate appeals, when judiciously made. Fifty years ago, it would not have been credited, that numbers have attended public worship in the chapels of those institutions, and conducted themselves with the greatest decorum, who in the halls were noisy, talkative, and profane.]

Sect. VII. — Puerperal Madness.

This term is chiefly and most correctly applied to a form of insanity incident to puerperal women. By some writers, the same expression has been so extended in its meaning as to comprise that species of derangement peculiar to females who are debilitated by suckling, and which commences in general several months after child-birth.

Symptoms of insanity occasionally display themselves during pregnancy, and under circumstances which indicate that they are dependent on that state. These cases are rare in comparison with those which occur after delivery. M. Esquirol mentions the instance of a young woman, of very sensitive habit, who had attacks of madness on two occasions, each of which lasted fifteen days, having commenced immediately after conception. The same writer observes also that several women at the Salpêtrière have become maniacal during the time of their pregnancy.

Cases of puerperal madness, properly so termed, that is, coming on after child-birth, are by no means infrequent. M. Esquirol has related that among 600 maniacal women at the Salpêtrière,

there were 52 cases of this description. In another report by the same writer, there were 92 similar cases among 1119 insane females admitted during four years into the above-mentioned hospital. M. Esquirol is of opinion that the proportion is still greater in the higher classes of society, since out of 144 instances of mental disorder, occurring in females of opulent families, the symptoms had displayed themselves, in 21, either soon after child-birth or during the period of lactation. Dr. Haslam enumerates 84 cases of puerperal mania in 1644 cases admitted at Bethlem. Dr. Rush, however, reckons only five such cases in seventy, received into the hospital for lunatics in Philadelphia.

There is no peculiarity in the phenomena of puerperal madness by which this disease is distinguished from other examples of insanity. Dr. Gooch has remarked that "if a physician was taken into the chamber of a patient whose mind had become deranged from lying-in or nursing, he could not tell by the mere condition of the mind that the disease had originated in these causes."

Those cases which are more properly termed puerperal, as occurring in the first period after child-birth, are generally of the character of mania, attended with excitement of the feelings and mental illusions; while the disorder which displays itself in women exhausted by suckling, is most commonly connected with melancholy depression, a tendency to which may generally be perceived in females who nurse their children too long, with reference to the strength of their own constitutions. Cases of the former description occur within a short period, and most frequently within a fortnight after delivery. They appear sometimes to be occasioned by fright or other accidental causes of disturbance; sometimes by errors in diet, or by premature exertions or excitements: in other instances they take place independently of any discoverable external cause. The patient passes one or two restless nights, appears unusually excited and irritable, talks loudly and incessantly, and very soon betrays a disturbed intellect. The attack is often attended with febrile symptoms. This is the case especially, as Dr. Burrows has observed, if it takes place about the fourth or fifth day, when the secretion of milk is producing a new excitement. The state of the pulse is the most important symptom in reference to the nature and treatment of the case, as well as to the prognostic which is to be formed of its result. Dr. Gooch has laid particular stress on this circumstance, and he has extracted a valuable passage which bears upon it from the manuscript lectures of Dr. Hunter. "Mania," said this eminent practitioner, "is not an uncommon appearance in the course of the month, but of that species from which they generally recover. *When out of their senses, attended with fever, like paraphrenitis, they will in all probability die;* but when without fever, it is not fatal, though it (i. e. fever) generally takes place before they get well. I have had several private patients, and have been called in when a great number of stimulating medicines and blisters have been administered, but they have gone on as at another time, talking nonsense, till the disease has gone off, and they have become sensible. It is a species of madness they generally recover from, but I know of nothing of any singular service in it."

Dr. Gooch's comment upon this passage is the remark, supported by his own observation, that there are two forms of puerperal mania: one of them is attended by fever, or rather by a rapid pulse; the other is accompanied by a very moderate disturbance of the circulation. Cases of the latter kind, which happily are by far the most numerous, terminate in recovery; the former are generally fatal.

Terminations of Puerperal Madness. — Puerperal madness terminates, in a great proportion of cases, either in death or in the recovery of reason. Few instances, comparatively, become cases of permanent insanity. It is, however, very difficult to obtain accurate information on this subject. Dr. Gooch has observed that the records of hospitals contain chiefly accounts of cases which have been admitted because they had been unusually permanent, having already disappointed the hope, which is generally entertained and acted upon, of relief by private care: the cases of short duration, which last only a few days or weeks, and which form a large proportion, are totally overlooked or omitted in the inspection of hospital reports. This remark accounts for the unfavourable nature of the results which are obtained from such tables as those given by M. Esquirol and others. By this writer, ninety-two cases are enumerated, of which fifty-five recovered, and six died, leaving thirty-one as the number of incurables, that is, one in three. Of the fifty-five recoveries, thirty-eight took place within the first six months. Dr. Haslam says that of eighty-five cases admitted at Bethlem, only fifty recovered, leaving thirty-five as the number of incurables. Dr. Burrows mentions fifty-seven cases, of which thirty-five recovered, and eleven remained uncured; of the recoveries, twenty-eight took place within the first six months. Dr. Gooch has remarked that these tables throw but little light upon the real proportions of recoveries, and present a prospect unnecessarily gloomy and discouraging. He adds, "Of the many patients about whom I have been consulted, I know only two who are now, after many years, disordered in mind, and of them one had already been so before her marriage."

The question, on the solution of which there is the greatest reason for anxiety in reference to any particular case of puerperal madness, is, whether it is likely to be fatal; because, if not fatal, there is great probability of ultimate recovery. The most satisfactory way of coming to a conclusion on this inquiry, in any individual case, is by the prognostications which the particular symptoms afford, and on this subject we can add little to what has already been said. The principal danger which menaces life, in cases of this description, is a state of extreme debility; the excitement of the vascular as well as of the cerebral functions, is so great as to wear out the strength, already at a low ebb, and neither recruited by nutrition nor by sleep, and the patient sinks from exhaustion. Experience has proved that a rapid circulation is the principal circumstance which tends to bring on this state. A very frequent pulse is the most

unfavourable symptom. Long-continued resistance to sleep, and a state of complete restlessness, and the appearance of great weakness and inanition, give likewise reason for apprehension. If these signs are not found, the mental derangement of the patient need not give occasion to very serious alarm.

Medical authors have sought to found a prognostic in puerperal madness on the estimate of the proportions which deaths bear to recoveries. This cannot afford evidence on which so much reliance may be placed as on the symptoms of individual cases. Out of the ninety-two cases mentioned by M. Esquirol, of which fifty-five terminated in recovery, there were, as we have observed, six deaths, and in Dr. Burrows's table of fifty-seven cases there were ten deaths. The former calculation gives one death in fifteen cases, and the latter one in six. But the patients in the Salpêtrière are probably removed thither after the period in which the disease is most dangerous to life. There must have been some circumstance tending to explain the discrepancy in the above-mentioned results. The proportion of deaths given by M. Esquirol's table may be somewhat too low, but we are inclined to believe that the result afforded by that of Dr. Burrows gives a greater mortality than the average number afforded by general experience.

Pathology of Puerperal Madness.—The pathology of this disease involves several disputed questions, which we must not pass over without stating them, although we by no means expect to furnish a solution that shall be satisfactory to all parties.

The first inquiry is whether puerperal madness depends for its immediate or proximate cause on inflammation of the brain and its membranes.

The arguments urged in proof of this opinion, are, in the first place, the result of anatomical examination in cases of madness in general. We must refer to a former section of this treatise on the necroscopical researches into the state of the brain in the bodies of maniacal patients, for evidence on this subject, and for proofs of the general inference that inflammation, or a state closely allied to inflammation, is really the condition of the brain in cases of insanity. As puerperal madness is identified by its symptoms with other forms of insanity, this analogical argument has evidently some weight until it shall be proved that this particular form of mental derangement furnishes an exception to the general fact.

Secondly, the phenomena displayed by dissections in cases of puerperal madness itself, have been thought by some to afford evidence in favour of the same conclusion. Unfortunately there is some discrepancy in the results of anatomical researches in respect to such cases. We have no extensive record of accurately related dissections, which might illustrate on a large scale the pathology of this disease. M. Esquirol says that he has examined the bodies of several patients who have died under puerperal mania, without being able to detect any morbid traces that pointed out the seat of the disease; and Dr. Gooch has given the details of a case, at the termination of which he says, in general terms, that although the body was examined by a very eminent anatomist, no vestiges of disease were discovered in the brain or elsewhere. In several other cases, however, described by the same eminent writer, it must be observed, that although the complaint had occurred in bodies already exanguious from uterine hemorrhage and other exhausting causes, there were discovered on dissection thickenings of the dura and pia mater, sinuses full of blood, serum effused under the arachnoid membrane, hardness of the brain, and numerous bloody points, on cutting the substance of the hemispheres. Dr. Burrows has likewise referred to several cases in which there were marks of cerebral congestion; and in particular to one of Newman's dissections, in which the arachnoid membrane was quite firm, and nearly as thick as the dura mater. On the whole there is sufficient evidence that in general the brain of puerperal maniacs displays, in a greater or less degree, the phenomena which are accounted to indicate the presence of inflammation.

The reasons which in the minds of some writers have over-weighed all the arguments furnished by these observations, are the following: first, that the disorder in question frequently attacks patients who are previously in a state of great exhaustion, and therefore thought unlikely to be assailed by complaints of an inflammatory nature; and secondly, that puerperal madness, as might be expected from the circumstances under which it takes its rise, and the exhausted and debilitated state of many patients who are attacked by it, cannot be safely treated by powerful antiphlogistic measures, such as copious bleeding. "Are we," says Dr. Gooch, "to shut our eyes to the symptoms during life, to the effect produced by remedies, to the mode in which death comes on,—that is, with symptoms of exhaustion, and to the remarkable emptiness of the veins throughout the body; and because there was a little serum under the tunica arachnoides, and more bloody points than usual in the medullary substance of the brain, conclude that it was a disease of congestion or inflammation, and that perhaps the patient died because she was not blooded sufficiently?" This last part of the inference would, indeed, be much more than the premises would warrant; the question, what is, in a pathological point of view, the condition of the brain, becomes comparatively unimportant and almost a matter of mere curiosity, when the practical indications are already given, and even become the data from which we are to deduce reasons as to the nature of the disease. Yet it must be allowed that the existence of inflammation is not disproved by either of the arguments advanced. The disease supervenes on an exhausted state of the system, but so do many other inflammatory complaints. Pneumonic affections often attack women who have suffered much in childbirth from uterine hemorrhage, but we do not for this reason call into question the inflammatory nature of pneumonia. Neither are we authorised in asserting that the disorder is not inflammatory, by the fact that the patients labouring under it do not bear bleeding ad libitum. How many inflammatory complaints are there in which we cannot venture freely on the use of the lancet! Dr. Gooch's observation is, in a practical point of view, of the highest value. Antiphlogistic and evacuant remedies must not be used without the greatest caution in cases

of puerperal madness; but the existence of inflammation in the brain and its membranes, when evidence of it is displayed in the characteristics of vascular fulness and other usual phenomena, is not disproved by this consideration.

The theory of this disease, in reference to the nature of its constitutional and proximate causes, may be different in cases which occur at different periods; and this is the more likely, because these cases vary in respect to their phenomena.

In those instances of maniacal affection which occur during pregnancy, it is probable that the disordered state of the brain or of the cerebral functions is the result of sympathetic excitement, which the vascular system, perhaps that of the brain in particular, sustains from the peculiar state of the uterine functions. The well-known complaints connected with temporary excitement of the brain in some females at the period of the catamenia, the symptoms thence resulting, such as the returns of hysterical, epileptic, cataleptic paroxysms, or of hysterical and sometimes maniacal excitement of the mind, are pathological facts sufficiently illustrative of the affection alluded to, and show it to be in accordance with other morbid phenomena.

When madness comes on after childbirth, the pathology of the case is, perhaps, different from that of the affection now described. Dr. Gooch said, "the cause of puerperal mania is that peculiar state of the sexual system which occurs after delivery." He afterwards thought this account of the matter not sufficiently explicit. "What I meant was this; the sexual system in women is a set of organs which are in action only during half the natural life of the individual, and even during this half they are in action only at intervals. During these intervals of action they diffuse an unusual excitement throughout the nervous system,—witness the hysteric affections of puberty, the nervous susceptibility which occurs during every menstrual period, the nervous affections of breeding, and the nervous susceptibility of lying-in women. I do not mean that these appearances are to be observed in every instance of puberty, menstruation, pregnancy, and childbirth, but that they occur sufficiently often to show that these states are liable to produce these conditions of the nervous system." He adds, "Dr. Marshall Hall thinks that the susceptibility of the puerperal state is to be explained by mere exhaustion, and does not at all depend on the influence of anything specific in the condition of the several organs at that time; but would an equal or greater degree of exhaustion at any time occasion the disease? This is a question of fact which I should answer in the negative. I have seen patients who have been deranged in childbed, and who had recovered, at a future period much more exhausted by illness, and much more agitated in mind, without the slightest appearance of mental derangement."

It would seem that we are here referred for an explanation of the maniacal affection which occurs soon after childbirth, to excitement produced by the state of the uterine system. A remark, however, which obviously suggests itself on this subject is, that the phenomena of puerperal madness usually display themselves just at the period when uterine excitement is subsiding. If ever the uterine functions, or the activity of the whole system of organs connected with them, is suspended, it is during the time shortly following the puerperal period. We should not, at this conjuncture, expect the brain and the mind to be excited by sympathy with organic actions, which are in fact in a state of temporary cessation. But the expression, excitement of the sexual system, which is allowed to be too indefinite to convey a very precise meaning, may include the process of lactation. Perhaps it is to the irritation produced by the secretion of milk that we are more particularly to direct our attention; for this secretion is a part of the series of functions belonging to the sexual system. But here we only return to the popular notion, according to which the disorder depends on the flow of the milk. Such is the opinion of old women and nurses in general, and it may be the true one. The relations, however, of puerperal madness to the different processes which are set up or cease in the animal economy subsequently to childbirth, will be illustrated, if susceptible of illustration, by an exact observance of the periods at which this affection most frequently displays itself. The information obtained on this subject is not so complete as we might desire, but still it is of some value.

Sauvages and other writers have recognised two different forms of mental derangement incident to lying-in women. One of them has been termed "*paraphrosyne puerperarum*," and is observed to succeed labour, immediately or within a day or two, before the secretion of milk can disturb the system, and independently of any lochial suppression. "These attacks," says Dr. Burrows, who assents to the above distinction of varieties in the disease, "will sometimes go off under the operation of a smart purge and an opiate, and may then be considered as merely accessions of delirium; in other instances they are more permanent, and become fully developed instances of puerperal insanity. Sauvages' second species is termed '*mania lactea*;' and Dr. Burrows is of opinion that maniacal symptoms in reality make their appearance most frequently about the third or fourth day after childbirth, which countenances the notion that they are connected with the lacteal secretion. This writer, however, has very candidly referred to the evidence deducible from the tables published by M. Esquirol, although it is rather opposed to the opinion above stated. From these tables it appears that in the years 1811, 1812, 1813, 1814, eleven hundred and nineteen insane women were admitted into the Salpêtrière, of whom ninety-two laboured under puerperal madness: of these—

16 became delirious from the first to the fourth day.
21 from the fifth to the fifteenth day, which generally includes the termination of the lochia.
17 from the sixteenth to the sixtieth day.
19 from the sixtieth day to the twelfth month of lactation.
19 after forced or voluntary weaning.

The result seems to be, as Dr. Burrows allows, that the disease is more frequently a consequence of delivery than of suckling.

On the whole it appears evident that some cause more general in its influence than any one particular process must be referred to, if

we would explain the frequent occurrence of madness in pregnant, puerperal, and suckling females.

A view of this subject which seems to us more illustrative of it, occurred to Dr. Ferriar, and has been thus stated by him.

"I am inclined to consider the puerperal mania as a case of conversion. During gestation, and after delivery, when the milk begins to flow, the balance of the circulation is so greatly disturbed as to be liable to much disorder from the application of any exciting cause. If, therefore, cold affecting the head, violent noises, want of sleep, or uneasy thoughts, distress a puerperal patient before the determination of blood to the breasts is regularly made, the impetus may be readily converted to the head, and produce either hysteria or insanity according to its force and the nature of the occasional cause."

That new determinations in the vascular system should ensue on the removal of one so long subsisting as that to the uterus during pregnancy, is in accordance with a well-ascertained principle in pathology. The natural and healthy determination under these circumstances is to the lacteal glands, but owing to various causes, either external or of predisposition, morbid determinations occasionally take place. Some women become phthisical at a very early period after childbirth, or rather the symptoms of phthisis develop themselves at that time in a manifest form. Other constitutional complaints are apt to arise at the same period, according to the prevalent tendency of the habit. When the brain is susceptible, it is likely to suffer in its turn, and become the seat of local disorder, the manifestations of which are affections of the mind. If we consider the frequent changes of disturbances occurring in the balance of the circulation from the varying and quickly succeeding processes which are carried on in the system during and soon after the periods of pregnancy and childbirth, we shall be at no loss to discover circumstances under which a susceptible constitution is likely to suffer. The conversions or successive changes in the temporary local determinations of blood which the constitution under such circumstances sustains and requires, appear sufficiently to account for the morbid susceptibility of the brain.

The cases of mental disorder which occur in the later periods of lactation are, as it is evident from M. Esquirol's table, of two kinds. In one the disease supervenes on weaning, and probably has its origin in the subsidence of the lacteal secretion. There are other instances which appear to arise from the continued excitement and exhaustion of the system consequent on suckling. This state of exhaustion takes place at different periods in different constitutions. Some women can continue to give milk without injury for years, but by others, morbid feelings are experienced in the space of a few months or even of as many weeks, and do not subside for some time after weaning. The writer of this article has observed very numerous instances of melancholy dejection with symptoms of insanity more or less strongly marked, which have displayed themselves in the protracted period of nursing, and in females who were evidently suffering from exhaustion. In one instance a lady, who on former occasions had complained of feelings termed nervous, and had been much indisposed when giving milk, was persuaded to continue suckling a child until the thirteenth or fourteenth month. She was then attacked by a maniacal disorder, which, though of a mild character, was very decided in its nature. Nearly a year passed before her mind was perfectly restored.

Treatment of Puerperal Madness.—If we consider that the greatest danger to be apprehended for patients labouring under puerperal madness arises from a state of extreme exhaustion, that many women die from this cause within a short interval from the commencement of the disease, and that if they survive this period, the healthy state of the mind is in most instances restored, it will be evident that our chief endeavours must be directed to the present support of life. If we can maintain and restore the general health, and keep the natural functions in a state compatible with continued existence for a time, the disease of the animal system will in all probability subside. Antiphlogistic and particularly evacuant remedies must be used very sparingly and with great caution.

1. Bloodletting, as a general remedy for puerperal madness, is condemned by all practical writers on whose judgment much reliance ought to be placed. M. Esquirol is decidedly opposed to it. Dr. Gooch's observations on this subject contain the best exposition of the rules which ought to guide medical practitioners as to the use of the lancet in cases of puerperal madness. He says, "The result of my experience is, that in puerperal mania and melancholia, and also in those cases which more resemble delirium tremens, bloodletting is not only seldom or never necessary, but generally almost always pernicious. I do not say that cases never occur which require this remedy; no man's experience extends to all the possibilities of disease, but I have never met with such cases, and I would lay down this rule for the employment of bloodletting—never to use it as a remedy for disorder in the mind, unless that disorder is accompanied by symptoms of congestion or inflammation of the brain, such as would lead to its employment though the mind was not disordered. Even here, however, great caution is necessary; local is safer than general bleeding. In one case the head was hot, and the face red, and the pulse was said to have become somewhat hard, yet a bleeding of eight ounces was followed by extinction of the pulse within three hours, and death in less than six. The only cases attended by a quick pulse which I have seen recover were those in which no blood was taken. In the really inflammatory disease of the brain, bloodletting of course is essentially necessary; but these, I think, can never be mistaken for puerperal insanity; they are febrile headachs, more or less acute. Pain of the head with fever is a much better indication for bloodletting than disorder of the mind without these symptoms."

2. In cases attended with much heat about the scalp, flushing of the face, and strong pulsation of the temporal and carotid arteries, it will be proper to shave the head and keep it cool by means of cold lotions, or an oil-skin cap filled with ice or iced water, or by evaporating lotions.

If the symptoms above mentioned and those of mental excitement are very acute, and the debility of the patient is not in an alarming degree, a few leeches may be applied with advantage. Blisters to the occiput or nape of the neck are often serviceable; they are much recommended by practical writers. When the scalp is not hot, and the tendency of the disease is rather to stupor than to a high degree of excitement, blisters are usefully applied over the top of the head.

The lower extremities, which are often cold, should be frequently immersed in hot water, or a hip-bath used. Dr. Burrows recommends bathing the legs and feet in a warm infusion of mustard or horse-radish. Heat should be applied in the most convenient form, and the circulation in the extremities promoted by other obvious means.

3. Purgatives and emetics are among the most useful remedies in this disease. The alimentary canal is frequently in a disordered state, the tongue furred, the breath fetid, the skin discoloured, the evacuations dark and offensive. A few brisk purgative doses, calomel followed by castor oil or rhubarb and magnesia, should be given in such cases. Emetics of ipecacuanha, with small doses of tartarized antimony, are very valuable remedies in this state of the alimentary canal. Dr. Gooch has remarked that they should be used with caution when the face is pale, the skin cold, and the pulse quick and weak; and in general he prefers ipecacuanha to antimonials.

4. After these evacuant remedies have been premised, great advantage is frequently derived from the use of opiates. Full doses are generally attended with the best success. Ten grains of Dover's powders may be given at night, or a grain and a half of solid opium, or thirty drops of the tincture. Several writers recommend Battley's solution of opium in preference to the tincture; perhaps the acetate and muriate of morphia are the best preparations of opium; they may be given in doses of a quarter or half of a grain, and repeated every third or fourth hour until sleep is procured. When opiate disagrees, Dr. Gooch recommends the use of hyoscyamus, mixed with camphor. He says that five grains of each should be given every sixth hour, and a double dose at night: a dram of the tincture will answer the same purpose. This writer is of opinion that narcotics are the most valuable remedy in the cure of puerperal mania; he says "that they often produce nights of better sleep and days of greater tranquillity, and this calmness is followed by some clearing up of the disorder of the mind." He says that these remedies produce salutary effects much more frequently in the mania of lying-in women than in maniacal disorders occurring under other circumstances; if, however, there is heat in the head, flushing in the face, and thirst, their use ought to be postponed until such symptoms shall have been removed.

5. In the more protracted cases of puerperal madness, tonic and stimulant medicines are sometimes requisite, especially when the appetite has failed. Ammonia is much recommended. It may be given with infusion of cinchona or any bitter infusion. When it is not offensive to the stomach, the rectified oil of turpentine is one of the best stimulants, especially if taken in the dose of a drachm three times in a day with cinnamon water, or any other aromatic fluid.

6. A rule of great importance refers to the *diet* of women in puerperal madness. It may, perhaps, be safely asserted that the greatest risk which patients in this disease incur is that of being starved through the mistaken notions of their attendants, who are too often disposed to consider the excitement of maniacal disease a reason for withholding food, when this very state, owing to the exhaustion produced by its long continuance, renders it especially necessary to support the strength more carefully. Farinaceous fluids of a nutritive quality, milk, rice, and other such matters should be given at short intervals, when febrile symptoms preclude the use of animal food. In most instances broth may be allowed and ought to be given. In the more protracted periods, solid meat, with malt liquors, should be taken. We have seen very many maniacal patients labouring under great weakness and exhaustion, with cold extremities, a clammy skin, passing sleepless nights, and under continual agitation, begin to improve as soon as their diet was changed, and meat with some ale or porter given daily. The pulse has become fuller and less frequent, the extremities warm, sleep has been restored, and convalescence has taken place in a surprisingly short period after such a system has been adopted.

7. The last observation to be made refers to the *management* of such patients. We must here advert to the remarks to be found in a former section on the management and moral treatment of maniacal patients in general. The general rules only require modification in some particulars in relation to the peculiar circumstances of puerperal patients. The latter for obvious reasons cannot be soon removed from home. They require in other respects similar management. They should be separated from relatives and friends, and carefully attended by persons who are fitted for the occupation by habit. It will not so often be necessary to send puerperal maniacs to lunatic asylums as deranged persons of a different description.

Sect. VIII.—Senile Dementia.

Senile dementia is essentially distinct from insanity; yet for various reasons that will be apparent, a short account of its phenomena will be properly introduced in this place.

We have already described that species of fatuity which is the frequent result of protracted insanity. The term dementia has been adopted by late writers to designate this morbid state of the mental faculties. This expression, however, has been used in a somewhat more extensive sense, as equivalent to fatuity in general, and as denoting, besides the ordinary sequel of madness, various other morbid conditions, in which the intellectual powers are impaired or obliterated. It is applied to the fatuity which occasionally follows apoplexy, epilepsy, palsy, and other comatose diseases. By many French authors the same term has also been made to comprehend the mental disease or decay peculiar to old age. In its last stage fatuity displays nearly the same phenomena in every case, by whatever causes induced or by whatever previous diseases it may have been ushered in; but in the early periods, to which,

for reasons already explained, we purpose to limit the application of the term dementia, there are many shades of difference between its different forms. The intellectual weakness which follows apoplexy is not precisely of the same character as that demented state which is the sequel of insanity, and which occasionally gives way either to a renewal of maniacal excitement or to returning reason; nor is either of these affections precisely analogous to the decay of mind incident to old age. We must, in compliance with custom, continue to use the received term, but we shall distinguish the last-mentioned affection by the additional epithet of *senile* dementia.

The following is the description of dementia in general which has been given by M. Esquirol. "Dementia deprives men of the faculty of adequately perceiving objects, of seeing their relations, of comparing them, of preserving a complete recollection of them; whence results the impossibility of reasoning correctly. Demented persons are incapable of reasoning, because external objects make too feeble an impression upon them; because the organs of transmission have lost a part of their energy; or, lastly, because the brain itself has no longer sufficient strength to receive and retain the impression which is transmitted to it; hence it necessarily results that the sensations are feeble, obscure, incomplete: being unable to form a true and just idea of objects, these persons cannot compare them, or exercise abstraction or association of ideas; they are not capable of a sufficiently strong attention; the organ of thought has not energy enough: it has been deprived of that vigour which is necessary for the integrity of its functions. Hence the most incongruous ideas succeed each other; independent of each other, they follow without order and connection; patients repeat words and entire sentences without attaching to them any precise meaning; they talk, without being conscious of what they say. It seems as if unreal expressions were heard by them in their heads, which they repeat in obedience to some involuntary or automatic impulse, the result of previous habits or of fortuitous association with objects which strike their senses."

Senile dementia differs in many particulars from the state of disease just described, though in some others resembling it. There is in both cases the same speedy and almost momentary obliteration of recent impressions, if the merely passive recognition of objects which present themselves to the senses may be so called. But in the disease peculiar to old age it may often be observed that ideas which were long ago stamped upon the mind remain with nearly their original force, and are capable of being called up whenever association suggests them, or the attention is purposely directed to them. The impressions produced by present objects are often so slight and evanescent, and the notions connected with them are so confused and indistinct, that the individual affected scarcely knows where he is; yet he recognises without difficulty persons with whom he has long been acquainted, and if questioned respecting his former life and the transactions and pursuits of his youth or manhood, he will often give pertinent and sensible replies. The disorder of his mind consists not in defective memory of the past, but in the incapacity for attention and for receiving the influence of present external agencies, which, in a different state of the cerebral organization, would have produced an effect upon the sensorium, or seat of sensation and perception.

The following account briefly describes the state of a person labouring under senile dementia, who has been occasionally under the care of the writer of this article. It will serve to exemplify some of the foregoing remarks.

A. M———, aged about seventy years, was in his youth a farmer, but changed that occupation for the business of a baker, which he followed until he had accumulated property sufficient for his maintenance. He has been living for several years in retirement, and without any regular occupation. His memory is said to have undergone a gradual decay. When he is questioned respecting present objects and circumstances, he generally gives clear and distinct answers, but can seldom recollect what has occurred but a short time previously. In half an hour after he has been visited by his medical attendant, who is an intimate acquaintance, he will say, if asked, that he has not seen him for several days. His recollection of persons whom he knew in the former periods of his life, and of events which then happened to him, is tolerably clear; but at times, and especially after sleep, he does not know where he now is. He sometimes fancies, at night, on waking from a short sleep, that he is engaged in his former occupations. He has risen from bed, and set himself busily to prepare for lighting a fire in his oven, beats the wall, calls his men up, and asks if the fagots are ready. He cannot be persuaded without great difficulty that he is in ——— street, and has nothing to do with the baking business. At other times he will get up in great haste to go down and see somebody who is waiting for him on business, or thinks that there is a horse standing for him at the door, calls for his clothes, and wonders that his friends are so tardy in assisting him. At these periods his state is not that of ordinary somnambulism. He sees and knows some at least of the persons who are about him, and will converse with them. He sometimes, during the day-time, wonders where he is, does not know the place though he has resided in the same house for some years. The hostess, who is an old acquaintance, at length convinces him that he is at her home. When his recollection is roused, and his thoughts are drawn into the right channel, he has a correct knowledge of persons, and shows not the slightest trace of maniacal illusions, or of anything approaching to the character of insanity. He is glad to see his old friends, shakes hands with them in his wonted cordial manner, is on the best terms with his relatives, and never displays the least deviation from the natural and habitual state of his feelings and affections.

Senile dementia, or the decay of the mental faculties, is not the lot of old persons universally, though it is a condition to which old age may be said to have a tendency, and to which in the last stage of bodily decay some approximations are generally to be perceived. The change which time alone will perhaps sooner or later bring on, in those who long survive the allotted duration of man's days, may be accelerated by a variety of

circumstances. Among these is a life of too much activity and excitement, of mental exertion beyond what the constitutional strength of the individual is capable of supporting without constant effort; excessive anxiety and eagerness in the pursuit of business, or intense and unremitted application to studies of whatever kind. The minds and bodies of men are only fitted for exertion in certain degrees, which, however, differ in different individuals; but the powers of all are limited. All have need of occasional respite from labour, and the appointment of rest during one day in seven is, from physical considerations alone, calculated to promote the well-being of individuals and of society. We may observe that among those who neglect this ordinance, there have been many who have suffered the penalty in this life. Some have terminated a rapid and perhaps brilliant career of unremitting and successful exertions by suicidal madness, of which too many and too well-known examples might be cited; others, though in a longer measure of time, have accelerated the period of intellectual decay.

A second cause of senile dementia, next in the frequency of its operation to that which we have just mentioned, is the too liberal use of vinous or other fermented liquors. There are many persons who lead active lives, who are not considered intemperate, yet drink on an average nearly a bottle of wine a day. Such persons, if their lives are not shortened, have every reason to expect a premature imbecility. The same affection has been observed frequently to make its appearance in men long engaged in active pursuits, soon after they have relinquished their business or professions, and have laid themselves by to enjoy ease and leisure for the remainder of their days. The disease often appears in a more marked and sudden manner in elderly persons who have sustained a slight attack of apoplexy or paralysis, which has perhaps been speedily recovered, and expected to have left but slight traces of disease. That expectation is verified so far as the sensitive and motive powers are concerned, but the seat of intellect is found to have been shaken in its very centre.

Senile dementia is entirely distinct from that species of moral insanity which appears occasionally, as we have already observed, in aged persons. The former is merely a loss of energy in some of the intellectual operations. It brings with it nothing morbid or unusual in the state of the feelings or affections, no tendency to depraved or unaccustomed habits, nor, commonly, any change in the temper and general disposition of mind. Individuals to whose lot this complaint has fallen are seldom unhappy on account of it, and if they are in any degree aware of their condition, they bear it with patience and cheerfulness. The state of the affections remaining natural and unperverted, is indeed a general diagnostic between disorders consisting merely of impaired faculties, and the forms of madness. The reverse of the previous remark applies, as we have said in the former part of this treatise, to the various modifications of insanity, and probably in greater or less degree to every case which can with perfect propriety be designated by that term.

This last observation, in its reference to senile dementia, may suggest a hint as to the justice and propriety of certain proceedings which are occasionally attempted and put in force with persons labouring under that affliction. As madness not only disorders the intellect, but likewise perverts the moral habits and the natural feelings of the afflicted individuals who are victims to it, there arises hence an obvious and unquestionable propriety in putting them under restraint. They are then not only placed under circumstances more favourable and sometimes essential to the cure of their complaint, but are likewise prevented from committing acts dangerous to themselves and others, and such as the same individuals would perhaps have shuddered to reflect upon in the days of sane and unclouded reason. To act otherwise with them would indeed be the height of cruelty. But the case is widely different when the moral disposition and the entire mental character remain unimpaired, and the memory only fails, or the aptitude to intellectual exertion alone is diminished through the weakness of years. If an old man, who has spent the greatest portion of his life in active exertion, and has accumulated property by habits of labour and parsimony, after some time passed in retirement, begins to lose his recollection of passing events; if his faculties become impaired to a certain degree on account of that wealth which it has been the object of his life to accumulate, and for the amassing of which he has sacrificed all thoughts of ease and comfort during many successive years, he may now become the object of attack to some relative who may procure declarations of his incompetency to manage his estate. If such a person is brought before a jury and sharply interrogated, examined in figures, and puzzled by a variety of questions respecting matters of business, and other topics requiring accuracy in dates and calculations, it is not impossible that the affair may issue in his confinement in a lunatic asylum, or that at all events the management of his person and his affairs may be taken from the care of those to whom in the sound and entire state of his faculties he had confided both, and to whom, his moral affections and social feelings remaining yet unchanged, he still continues to be devotedly attached.

In France it has been for many years not unusual to confine aged persons of impaired faculties in the public *hospices* where deranged persons are admitted; and this practice has so much prevailed, that M. Georget alludes to it as a source of error and embarrassment in the attempt to determine the relative frequency of madness in late and in former times; these asylums being partly occupied by a number of old persons who remain till their decease, and whose disorders are not properly cases of insanity. Previously to the year 1790, out of 411 persons admitted as labouring under disordered or decayed intellect, there were only 19 whose age exceeded fifty years, whereas, in 2451 admitted between 1814 and 1821, not less than 880, or the third part of the entire number, were persons who had passed the period of life above mentioned. Of these, a great proportion were probably cases of senile decay. If the custom of thus getting rid of aged parents were a matter of choice and in general practice, without excuse on the ground of necessity, we might doubt whether

our enlightened neighbours displayed their filial piety in a more advantageous manner than the Battas, who knock their aged relatives on the head and eat them; or than the old Irish, who, as Strabo assures us, καλὸν τι ἡγοῦντο κατεσθίειν τοὺς πάτερας τελευτῆσαντας. But it is only among poor families that the custom prevails, and it is but parallel to the habit of the poor in England, who not unfrequently suffer their parents to die in parish workhouses. It is the greatest evil attendant on iron-handed necessity, that it so often breaks asunder the first and nearest bonds of duty and natural affection.

The following table will serve to illustrate the forms of disease which are included by medical writers under the common term of dementia. It is styled by M. Esquirol, from whom we extract it, a table of causes. The table exhibits the distribution of 235 cases of dementia; the first column contains the number of patients admitted at the Salpêtrière during the years 1811 and 1812; the second column is the report of the author's private establishment, and is limited to persons of the higher or more opulent classes of society.

TABLE OF CAUSES.

	No. of Individuals.		Total.
Physical Causes.			
Disorders connected with the catamenia	11	4	
Critical period	29	6	
Consequences of childbirth	5	3	
Blows upon the head	3	0	
Progress of age	46	3	
Ataxic fever	1	2	
Suppression of hemorrhoids	0	2	
Mania	14	4	195
Melancholia	13	2	
Paralysis	3	2	
Apoplexy	3	2	
Syphilis and abuse of mercury	6	8	
Faults of regimen	0	6	
Intemperance	9	6	
Masturbation	4	7	
Moral Causes.			
Disappointed love	1	4	
Fright	4	3	
Political excitement	0	8	
Disappointed ambition	0	3	40
Poverty	5	0	
Domestic griefs	8	4	
	192	73	235

It may be remarked in reference to the first column, that the cases placed under the heads, 1, 2, 3, 8, 9, 12, 13, 14, 16, 18, 19, 20, 21, amounting altogether to 102, were probably instances of insanity in some of its forms, or of the stages of fatuity which are its consequence. There only remain 60 cases, which appear to have been instances of dementia not preceded by madness. Of this remainder, 46 cases are examples of senile decay, and these appear to form the great majority of cases, which are referred by the writer above cited to the head of idiopathic dementia, or dementia, unconnected with insanity. It therefore appears that this class of diseases nearly resolves itself into the sequelæ of madness, and the decay peculiar to old age.

It is obvious that the art of medicine in reference to senile dementia must be limited as to its sphere, in a great measure to the means of prevention, as cure is scarcely to be hoped. The prevention of this melancholy termination must, however, depend upon the habits of the individual, and on the mode in which the previous years of life may have been passed. In the regulation of previous habits may be found resources adequate in general to averting the approach of mental decay. Much will depend upon the manner of living during the early period of old age, or when the physical powers are beginning to decline. Habits of indolence, and those of too great mental exertion, should be alike avoided; since many are observed to lose the vigour of their minds after a sudden and total retirement from active business, while in others the disordered state seems to have been brought on by too close application to studies, and particularly to those which require a sedentary life. The former of the causes above mentioned is, however, by far the most powerful and frequent in its operation, and numberless instances may be cited of persons who have exercised professions requiring considerable labour of mind during advanced years, without experiencing in consequence any decay of faculties.

The preservation of health in old age, both in other respects and in what regards the functions of the brain, will depend, in a very considerable degree, upon the adaptation of diet and regimen to the constitutional state of elderly persons. With the alteration of habits which advancing age implies, with the various changes in the state of the physical functions which it brings with it, a corresponding variation in diet and regimen is necessary, and if this is not made, disorder ensues. Many of the diseases incident to elderly persons are diseases of plethora, as apoplexies, and paralysis, and vertigo, and these are not unfrequently the preludes of dementia. The decay of faculties is observed to occur without such preludes in persons who live too freely. These and other considerations render it probable that the disorder of the brain connected with senile dementia depends upon a state of vascular repletion. When the disorders of old age have commenced, by a comparatively spare diet, consisting principally or entirely of farinaceous and other light vegetable food, by discontinuing in a great measure the use of wine and fermented liquors, the general health, and that of the brain in particular, will be greatly promoted. If there are decided threatenings of cerebral disease, an issue or seton, and the frequent use of mild aperient medicines to maintain a copious alvine discharge, will contribute to the same end, and will not only ward off attacks of apoplexy and palsy, but likewise lessen the tendency to senile dementia.

[The preparation of the above article suggested to Dr. Prichard his *Treatise on Insanity and other Diseases affecting the Mind*, (Lond. 1835,) which was reprinted in this country. It is a comprehensive and able work, and may be referred to for further developments of the subject. See, also, Art. Insanity, in Copland's *Dictionary of*

Practical Medicine; Esquirol, *Des Maladies Mentales*, Paris, 1838; and, for the arrangement, &c. of insane hospitals, Jacobi, Art. Irrenanstalten, in *Encyclop. Wörterb. der Medicin. Wissenschaft.* xix. 62: Berlin, 1839; and *On the Construction and Management of Hospitals for the Insane, with Introductory Observations*, by Samuel Tuke, Lond. 1841. A good account of the American insane institutions is given in the First Report of the Insane Asylum at Utica, N. Y.; also, in the Eleventh Annual Report of the Trustees of the State Lunatic Hospital at Worcester, Mass. Boston, 1844.

(For the medico-legal bearings of insanity, see MIND, SOUNDNESS AND UNSOUNDNESS OF.)]

J. C. PRICHARD.

INTERMITTENT FEVER.—See FEVER.

[INTUSSUSCEPTION, (from *intus*, within, and *suscipio—sus* or *sub* and *capio*, to take.) Intussusception or invagination of the intestines occurs when one portion of intestine passes into another. Owing to augmented peristaltic or spasmodic action of the intestines, an upper portion of intestine may be forced into a lower; or, should an inverted action of the intestines occur, it may happen, that the lower portion is forced into the upper, and becomes arrested there. The first of these lesions is called *progressive* intussusception; the latter *retrograde* intussusception.

Invaginations are not unfrequently met with in the dead body, especially in children; but these often occur, probably, as one of the last acts of life; whereas, the invagination, that gives rise to the concatenation of phenomena termed *ileus*, is accompanied by an inflammatory process, which causes the adhesion of the peritoneal surface of the invaginated portion of intestine to the portion of the peritoneal surface of intestine with which it comes in contact, so that the intussusception cannot be reduced after death. Owing to the narrowness of the canal, and the resulting obstruction, the phenomena induced by obstruction from whatever cause, or, in other words, those of ileus supervene.

Intussusception may take place in any part of the alimentary canal; but it is most frequently observed in the ileum near where it terminates in the colon. At times, the invaginated portion sloughs away; and there have been cases in which as much as three feet of intestine have been discharged *per anum*, with more or less of the mesentery attached. In thirty-five cases, collected by Dr. Thompson, (*Edinburgh Medical and Surgical Journal*, October, 1835,) the average duration of the disease was between four and five weeks. In twenty-two, the evacuated portion belonged to the small intestine; in the other, to the large, or to both. Where the invagination has proceeded to a great extent, or where the small intestines with the cæcum have passed down into the sigmoid flexure of the colon, as in some cases that have been related, the seat of the disease is manifested by a hard tumour; and in less marked cases careful examination has detected the existence of a deep-seated tumour.

Treatment.—From the obscurity that must necessarily exist as to whether the phenomena of ileus be produced by intussusception or some other cause of intestinal obstruction, it is difficult to direct an appropriate treatment. Should it be diagnosticated, or suspected, cathartics must of course be very questionable remedies; and the only hope we can have is, that the invaginated portion may be thrown off, and a cure be thus obtained; although such a result, it must be admitted, is extremely rare. The appropriate general treatment, in all such cases, is that advised under enteritis (q. v.);—bloodletting, general or local, or both, with full doses of opiates, the warm bath, &c.

Metallic mercury has been recommended by most writers in intussusception, as well as in every case of obstruction of the bowels; but it is not easy to comprehend on what principle it has been advised in intussusception. If it be of the progressive kind, the mercury must proceed directly through it; and if retrograde, the same thing might happen, or, if not, by passing between the intestinal and the invaginated portion, it might aggravate the disease.

It has been supposed that large quantities of water or air thrown into the bowels might cause the invaginated portion, in cases of progressive intussusception, to resume its proper position; and it has been proposed in suspected cases to introduce long bougies, and even pieces of whalebone, into the rectum, with the view of pushing back the intussuscepted portion; but cases can hardly be imagined in which such agents can be appropriate. Emetics have been suggested in cases of progressive intussusception, yet they could only be of service before agglutination of the peritoneal surfaces has occurred; and, besides, one of the evidences of intussusception is the antiperistaltic action and vomiting. Under the same reasoning, cathartics might be advised in the retrograde form!

Where evidence has happened to be very strong as to the existence of intussusception and its seat, the operation of laparotomy has been advised, with the view of disentangling the invaginated intestine; but it has been wisely discountenanced by almost all therapeutists. The symptoms of intussusception are always, indeed, obscure and doubtful, and may be produced by other states of the digestive tube; so that, if the abdomen were opened, it might be found that no intussusception existed; or if it did, that, owing to the agglutination, no separation could be effected without causing, if possible, a more speedily fatal lesion. These circumstances, consequently, render the operation wholly inadmissible.

ROBLEY DUNGLISON.]

IRRITATION.—It is remarkable that a term so commonly employed and so indispensable as this is, should never have received a definite and generally acknowledged application. The agents and subjects, the causes and effects, the influences and phenomena of disease, have all indiscriminately passed under the name *irritation*, until the word has ceased to designate anything, and, "vox et præterea nihil," is prostituted to pass off any obscure and unintelligible matter of pathology, for which more definite terms will give no quarter. If a case presents itself with bold and positive features, such as pain, convulsion, deli-

rium, palpitation, jarring pulse, and highly disordered function, but without certain characteristics of inflammation, it is distinguished by some as irritation; whilst others use irritation and inflammation almost as synonymous terms. If a person faints or dies under a surgical operation, or from a crushed limb, without hemorrhage, the result is ascribed to irritation: in another example, after the same accident, or the same operation, fever arises, and the patient dies in raving delirium; yet this is also termed *irritation*.

We do not venture to impugn the high authorities that have rendered the term conventionally applicable to such varied and opposite affections; but we would warn the student not to be misled in his reading, by the etymology of the word; nor to suppose that in the extended application which it has received from various writers, irritation means anything more restricted than a class of morbid states of very considerable variety.

In further illustration of these remarks, and as an introduction to this subject, we shall extract some account of the views of *irritation* from the works of two distinguished writers, M. Broussais and Mr. Travers.

M. Broussais ("Examen des Doctrines Médicales," and "Histoire des Phlegmasies Chroniques,") bases his description of irritation on the particular physiological views which he entertains respecting the vital properties of animal structure. These properties he calls sensibility and contractility; they are possessed in various degrees by the different tissues, and may be locally increased by certain circumstances; such local exaltation always causing a diminution or depression of vitality in some other organ or system. This exaltation of vitality is accompanied by an excessive afflux or congestion of fluids to the part, and constitutes what M. Broussais throughout his writings designates as *irritation*. The cause or circumstances which produce irritation are of four kinds: —1. Excessive excitement by certain agents, called stimulants or irritants, directly applied; 2. sympathy with another irritated organ; 3. the absence of a stimulus which is habitual to the part; 4. repulsion of excitability from other part or parts.

One of the most remarkable features of this doctrine is, that irritation, when once formed in any part of the system, becomes a cause of irritation in other parts or systems; the influence being propagated by sympathy through the medium of the nerves. The phenomena of irritation vary according to the part which it affects, but the afflux of fluids or active congestion, is common to all primary irritations, and this is prejudicial to the functions and regular nutrition of the part. The first seat of irritation is acknowledged to be in the nervous fibrils of the irritated part; and even in this stage irritation may be so intense as by means of the sympathetic effects on the system to cause death. But M. Broussais looks to the effects on the vascular system as the most important; and if he does not in his pathology describe irritation as vascular universally, his therapeutics certainly imply this; accordingly the terms irritation and inflammation are used indiscriminately throughout his works. The irritation may be confined to the white vessels only, and then he designates it a *sub-inflammation*; but this, as well as what is generally understood by inflammation, is included under the general term irritation.

The increase of sensibility and contractility implied in irritation is sometimes shown by pain, convulsion, &c., but it is not always directly manifest, and is frequently not so, when irritation has its seat in the viscera, where a system of nerves exists which do not transmit sensations to the sensorium. Frequently the sympathetic irritations are more manifest than the original one that excited them. These secondary irritations or sympathies are of two kinds, organic, and those of relation. The organic consist in organic phenomena, such as increased action, congestion, disordered secretion, nutrition, temperature, &c. Morbid sympathies of relation are shown by pain, convulsions of the voluntary muscles, and mental derangements. Any of these kinds of sympathy may be excited separately, but they more commonly coexist; and in proportion to their intensity and number will be the severity of the disease; these generally depend on the sensibility of the organ primarily irritated, and of the system generally. Sometimes the original irritation continues to be predominant; the organ which it affects being the only one to suffer from congestion and disorganization; but occasionally it happens that a secondary irritation becomes the principal; this constitutes *metastasis*. Again, the principal irritation may be transferred to some organ of secretion or exhalation, and is relieved by a discharge from the system; this is what is called a *crisis*. When irritation causes an accumulation of blood in a tissue, so as to produce swelling, redness, and heat, it is called inflammation, this being only an irritation of an intense kind, observing the same laws as irritations in general, except that when unrestrained it proceeds more speedily to disorganization. These appear to be the main features of M. Broussais' doctrine of irritation in general. In describing its further application to particular diseases, he generally uses the terms irritation and inflammation as synonymous, and ascribes to such an affection variously multiplied by sympathy and reaction, and occupying various seats, all febrile diseases, hemorrhages, profluviæ, morbid growths, most of the nervous diseases, dropsies, and even occasionally scurvy itself. In all febrile diseases and considerable inflammations, the heart is sympathetically irritated, whence the quick pulse and hurried circulation; but the main and most important seats of irritation, either primary or sympathetic, are the mucous membrane of the stomach and bowels, and the brain. In all fevers called idiopathic, these irritations are the primary evils: they are equally so in the exanthematous and some other diseases; and there is not an inflammation of an extent sufficient to quicken the pulse which does not sympathetically produce a decided irritation of these organs. The cerebral irritation is in most instances secondary to that in the stomach and bowels, and it always reacts on and increases the latter.

Without proceeding further in the details of this doctrine, which Coutanceau has well named the doctrine of irritation, we may sum it up by saying that there is not a disease to which the human body is liable which is not dependent more

or less directly on irritation. Such an excessive generalization, it might be expected, would have been confined to the name only, and although it should give a new aspect to pathology, it could hardly be anticipated that a corresponding innovation would have been extended to therapeutics. But the case is far otherwise. Broussais, in ascribing all diseases to irritation, and in viewing in that irritation nothing but a grade of inflammation, recognises truly curative means only in antiphlogistics, and denounces all other descriptions of remedy as irrational and hazardous. Nor is he less exclusive in his catalogue of antiphlogistic remedies: purgatives and emetics he prohibits as dangerous *irritants* of the gastro-enteric mucous membrane, that soul and focus of all sympathies: diuretics *irritate* the kidneys; expectorants the bronchial membrane: diaphoretics the skin; and instead of counteracting the original disease, they may reflect on it a new and aggravating irritation: the same objection applies in most instances to blisters and epispastics in general. In short, the whole class of antiphlogistic measures is, with trifling qualification, reduced to bloodletting, abstinence, and dilution.

Whatever may have been the triumphant proofs of success appealed to by the sanguine advocates of this doctrine, we refer to the united experience of the enlightened practitioners of this country, we refer to the records of these pages, for abundant evidence that its absolute practical application would be dangerous and unnatural, and that to deprive medicine of the agents that it so sweepingly proscribes, would be to curtail the art of its most salutary aids. Nothing can more strikingly expose the danger of excessive generalization than a familiar and unbiassed study of nature in all the varieties of her powers; and in our opinion the philosopher who would ascribe all natural phenomena solely to gravitation or some such general power, would not be more partial and incomprehensive in his views than the physician who attempts to restrict the still more complicated and diversified derangement of the animal body to an acknowledged but ill-defined principle, and to still further limit the practice of his art by a partial view of that principle itself.

Great credit is due to M. Broussais for having fully established the fact, hitherto but little noticed, that local inflammations, particularly in the stomach and bowels, are present in most febrile diseases; that such inflammations are capable of producing great disorder and even inflammation in remote organs, by sympathy through the medium of the nerves; and that similar affections frequently complicate themselves with and aggravate many chronic diseases. The most salutary results have been obtained from the application of this knowledge to practice, in the judicious use of adequate antiphlogistic measures wherever these inflammations subsisted; and a more qualified and cautious prescription of purgatives and other medicines in similar cases is another good flowing from the same source. But to make the word *irritation* the representative of the origin of almost every disease; to exclude from pathology all views of general morbid states, whether of plethora or inanition, excitement or depression; to refuse to acknowledge in local diseases any diversity of *mode* of action, referring all morbid phenomena and products only to excess or diminution; to exclude from therapeutics the whole class of alteratives, and to exaggerate in numerous kinds of evacuants their stimulant (often unproved) above their evacuant or antiphlogistic effects: to disregard the operation of narcotics, antispasmodics, and other medicines which exert a direct influence on the nervous system, and through it often favourably affect the vessels;—this is to deny ourselves the advantages of daily experience and unbiassed observation, and to render us the slaves of a system instead of the followers of nature.

If M. Broussais were a little more impartial and considerate towards his own principles, and would take more into view that state of the *nervous system* which he acknowledges to be primary in the state of irritation, and which, as existing alone, may properly be viewed as an object of distinct and specific treatment; if he would admit that a certain state of the vascular system is required before the irritation can produce inflammation, and that, therefore, antiphlogistics are indicated only when this state is present; and if he would take into consideration the secernent and exhalant power as well as the inflammability of the vascular system, and recognise the salutary operation of certain alterative, evacuant, and astringent medicines; then his physiological system would stand on a broad and comprehensive basis, and its application to practice would be consistent both with principle and with the general experience of the most successful practitioners. But in its present state we cannot but view this doctrine as partial and exclusive: and we would decline his use of the word *irritation* as vague in pathology, and fallacious in therapeutics.

The sense in which Mr. Travers uses the term is considerably different, but as he does not attempt to give a definition of it, it is difficult to render in a few words an explanation of his views. He seems to apply the name irritation to any disorder of sensation or function, whether of the nature of depression or excitement, that is not attributable to inflammation or to injury of the mere mechanism of parts. It is chiefly through the nervous system that the phenomena of irritation manifest themselves; and this constitutes the character which most distinguishes irritation from inflammation: but the relation of these two states of disorder must be as intimate as the connection between the nervous and the vascular systems is close and reciprocal. But it will, perhaps, more nearly represent Mr. Travers' view of irritation to say that it is a morbid modification of the irritability of a part or system. Here we are naturally led to inquire what *irritability* is, and what is its healthy proportion and mode of action. Of irritability it can only be said that it comprises the vital properties of a part or tissue, and is shared in various proportions and forms, by the different organs and texture of the body. If there is any rule observed in the distribution of this natural irritability, it is not in the ratio of sensibility, vascularity, or muscularity, but rather according to the importance of the organ in the functions of life. It is much more largely possessed by some individuals than others; and various circumstances, external and internal, are capable of producing a great variety

in its proportion in the same individual. An excess or deficiency of natural stimuli, or the operation of noxious agents, will convert healthy into morbid irritability; and again, if the share of irritability possessed by an organ be morbid, natural stimuli will produce irritation. Thus an irritable stomach may be nauseated and disordered by many ordinary articles of diet; an irritable bladder is continually parting with its contents before the stimulus of distension can be supposed to act: an irritable heart becomes tremulous and palpitating whensoever its action is excited; an irritable skin breaks out in a rash from many slight causes of excitement both of diet and temperature. The description which Mr. Hunter gave of irritability in a morbid sense, "over-action to the strength of the parts," and an irritable habit defined as "an increased disposition to act without the power to act with," accord with Mr. Travers' views of the subject, which are further exhibited in the following passage: "Extreme susceptibility and consequent over-activity are invariably coupled with and most probably dependent on weak and insufficient powers of constraint and resistance. The same principle which renders a part over-irritable renders it over-active. The balance of the system, adjusted by the state of even health, is disturbed by the preponderance or deficiency of either of its active functions, as by the imperfection and disease of either of its organs. A weak organ or constitution is one easily put out of order, because it is continually excited to greater activity than it has power to support,—greater, therefore, than is consistent with the harmony of the system. But action may be morbidly excessive or deficient, independently of organization; and this irregularity, although occasional at its commencement, may become habitual. A too irritable, nervous, or vascular function is, therefore, as marked a constitutional peculiarity as irritable lungs or skin. In a physical as in a moral sense, every individual has a weak part, and this observation would as often apply to the function as to the organ. Circulation, or respiration, or nutrition, in one or other of their many intricate processes, is below par in tone. The absorbent capillary function is below par in scrofulous habits, the arterial in the leucophlegmatic, the venous in those disposed to local congestions; the exhalant in the dropsical; and the pulmonary, gastric, hepatic, and renal, are respectively the failing functions in persons who eventually become the subjects of asthma, gout, jaundice, and stone." (On Constitutional Irritation, p. 15.)

This quotation, although referring only to susceptibility of irritation, will be sufficient to show the extensive view in which Mr. Travers applies the term under consideration. Irritation in this sense cannot be defined otherwise than as a disorder arising from a want of balance of functions. But as no disorder can exist without more or less of a loss of balance of function, it is obvious that there is nothing in this definition which can distinguish irritation from disease in general. It is, in fact, more according to their causes than by any common character in their symptoms that Mr. Travers groups the cases of disease as instances of irritation, and this is perhaps (especially as far as it relates to surgery) the most practical method of arrangement.

Irritation may be either local or general; that is, one or more organs or parts may be its seat, without the rest of the body partaking of the disorder, in which case, it is local; but when the principal functions become affected, the irritation may be called general or constitutional. Local irritation may sometimes become extended to the system, and thus become constitutional; this occurs in cases of severe external injury or disorganization, such as extensive burns, compound fractures, &c. Mr. Travers makes a further division of cases of constitutional irritation into two kinds, direct and reflected. Direct irritation is that wholly and immediately derived from a local source of irritation, the constitution having no share in its production, and is, therefore, proportionate to the local cause. Reflected irritation, on the other hand, originates in a peculiar morbid state of the constitution, is purely idiopathic, and being oftener the cause than the effect of local disordered action, is seldom influenced by local treatment. The symptoms characterizing direct constitutional irritation, are, in the nervous system, rigor, delirium, convulsion, coma; in the vascular, the fever of phlegmonous, suppurative, ulcerative, and gangrenous inflammations. Those which belong to reflected constitutional irritation are, in the nervous system, epilepsy, tetanus in all its modifications, and other anomalous forms of spasm, mania, &c.; in the vascular system, the fever accompanying erysipelas, scrofulous and carcinomatous inflammation, carbuncle, &c.

The division which Mr. Travers has thus made, appears to be abstractedly just and natural, and in extreme cases it is sufficiently easy to distinguish between the local and the constitutional origin of disease. But the more numerous cases of a mixed description, where sympathies and reactions are multiplied and complicated, and where local disease and a disordered constitution affect each other with equal or balancing forces, will seldom bear an exclusive reference to either of these divisions, and it would be unsafe to found practice generally upon them. They are unquestionably more applicable to surgery than to medicine; and it may be said that a principal part of the *medicine of surgery* consists in a due apportioning of the treatment between the local and the constitutional disease. The enumeration of symptoms, which we have quoted above from Mr. Travers' work, would give to the word irritation nearly as extensive a sense as that in which it is accepted by M. Broussais, since inflammatory and all kinds of symptomatic fevers are included under it, and, physiologically speaking, they are so with great justice; but in a practical point of view, seeing that these affections, whatever share irritation may have in them, have their distinct names, and their peculiar and varied forms of treatment, it would seem to us more desirable to limit the term irritation to those affections which partake of the character of excitement or increased vascular action, without the precise characters of fever and inflammation. Irritation undoubtedly attends all inflammations and fevers, but then its phenomena merge in those of the phlogosis or pyrexia, which in a specific and peculiar manner modify the course and determine the issue of the malady. Constitutional irritation is a state so

distinct from inflammation, that it has been remarked, and very justly, that in its characteristic form it is incompatible with it; the former ceasing to exist when the latter is established. It must, however, be admitted, that these two states pass into one another by gradations that it is often impossible to distinguish. Irritation may be considered to be the introduction or preliminary state to inflammation: it is the mobile part of it, and being transferred from one locality to another, draws the phenomena of inflammation after it. But it may exist independently of inflammation: certain additional circumstances are required for the production of the latter; if these are wanting, and the source of irritation still exists, a variety of phenomena ensue, expressive of excitement and disorder of function. What these additional circumstances are, we cannot absolutely specify; but a certain degree of plethora and power in the vascular system are elements which seem to be required before irritation can produce a true inflammation. It is such a plethora and susceptibility of the vascular system which constitutes the phlogistic or inflammatory diathesis; and where this is strong, irritations even of a mild nature may readily become extended to the vessels, and pass into inflammation. Where, on the other hand, the vascular system is ill filled and of low power, any irritating cause failing to excite it to inflammation, develops its effects in various other modes, such as disorder of sensation, secretion, and other functions, the nervous system being apparently the medium through which the irritating influence acts. Between the states of pure irritation and perfect inflammation there are, however, numerous intermediate gradations, in which the phenomena of irritation beyond what usually accompany inflammation manifest themselves, and prove, even in disorder, an unequal balance in the systems. So general is this fact, that there is not a malady of any kind in which more or fewer of the signs of irritation are not *occasionally* apparent, and the history of irritation in this sense would extend to varieties of the whole catalogue of diseases. Such a view would be far too extensive for the due limits of this article. We shall, therefore, merely give a sketch of the pathology of irritation in general, and conclude by a notice of the most remarkable examples of the different kinds of irritation.

Of Irritation in General.—The introductory view which M. Broussais gives of irritation, is far less objectionable than the indiscriminate and unqualified application to which he afterwards extends it; for truly, the reference of disease to changes in the physiological properties of tissues, if unbiassed and comprehensive, is, as far as diseases of the solids are concerned, a fair and natural basis of pathology. But to specify contractility and sensibility as the only properties of tissue, appears to us to be too hypothetical to be admitted as the ground-work of a doctrine; and as there is no necessity for analyzing functions, it is better to treat them simply as they present themselves. Neither are we inclined to adopt the dogma of M. Broussais, which is only a modification of that of Brown, that there is always an equal quantum of excitability in the system, and that an increase in one part necessarily produces a diminution in the other, and, therefore, that there is no such a state as general asthenia or as general excitement.

The functions of animal structure are relative; certain circumstances excite or increase, and others diminish or depress them: exciting agents are called stimuli or irritants; those which depress are called sedative. The relation of an irritant to a function is *irritation*; but the signification of the word here is twofold, for it implies, 1, the agency or act of irritating; 2, the effect or the excited state of the function. It is not unimportant to observe this distinction; and as the construction of our language does not admit of it in the word itself, we shall endeavour to restrict *irritation* to the latter meaning, and describe the other as the *irritating influence* or *act*. Without attempting to explain them, it will be convenient to represent the living properties in general by the word irritability, which merely denotes their relation in the abstract to irritants. There is a certain share of irritability natural to the healthy state of every part, and the moderate operation of natural irritants upon this, constantly induces that degree of irritation which constitutes healthy function. Irritation in a morbid state implies excess, which, when great, sufficiently declares itself by the disorder or loss of balance that ensues; but in smaller degrees, morbid irritation is as hardly discernible from healthy as slight disease is from health.

Irritation may arise from an excess of irritability in a part independent of external circumstances, so that the ordinary or habital stimuli become irritants; or it may proceed from an additional irritating influence from without. Thus vomiting is a symptom of irritation of the stomach: and it may arise from excessive irritability of that organ, as in gastritis, and in the sympathetic irritations of the stomach from concussion of the brain, diseases of the urinary organs, pregnancy, &c.; it may on the other hand proceed from the additional irritating influence of an emetic or of indigestible food. So, likewise, irritation of the mucous membrane of the lower intestines may manifest itself by diarrhœa; and this irritation may proceed from the over-irritating quality of the contents of the intestines as in bilious diarrhœa, and the operation of a drastic purgative, or from the excessive irritability of their membrane, as in dysentery, lientery, &c. Again, the urinary bladder shows signs of irritation when subjected to the unusual stimulus of gravel or stone; and the same phenomena are presented when, either from disease in its coats or by sympathy with some adjacent parts, as in stricture of the urethra and rectum, scirrhus uteri, ascarides, &c., the irritability of the bladder is inordinately increased, and it is continually parting with its natural contents. This division of the modes of irritation is useful, inasmuch as it points out a distinction which is sometimes of the greatest importance in practice, but it is one that cannot always be made; for the two modes frequently unite, and an excessive irritating influence very commonly induces an unnatural irritability of the part to which it is applied. Thus, after an emetic or other irritating substance has been rejected from the stomach, the organ continues for a while morbidly irritable, and refuses to retain the blandest liquids; and the blad-

der often remains irritable after all the gravel has passed away. Again, when the irritability of a part is low, what is commonly an irritant may fail to produce irritation. Thus an emetic sometimes fails to excite vomiting; crude and indigestible food may pass through the stomach, and fæces may accumulate in the intestines without injury; worms may inhabit the viscera, and gravel lie in the bladder, without any remarkable signs of irritation in the respective organs. The same remarkable difference in the susceptibility of irritation is observable in the same individual under different circumstances, and even simultaneously in different parts of the same system. To say that this susceptibility of irritation depends on the degree of sensibility is only to adopt another mode of expression without making the matter more plain. It is generally under the influence of a new or additional irritation that a part becomes awakened to the presence of irritating matters of which it was before insensible. Thus an inefficient purgative frequently develops the irritating influence of fæces long accumulated in the cells of the colon; an excess of diet renders the urinary bladder sensible of the pressure of a calculus hitherto latent; a fit of indigestion occasions irritation of a tumour or other organic disease in the brain to produce a fit of epilepsy. But it is through the medium of the nervous sympathies, which produce what is called constitutional disturbance, that local sources of irritation are most frequently excited. Any thing that disturbs the balance of the functions in general is sure to be felt in the weak or disordered part; and a cause of irritation, which may be long latent during the quiet and equal action of functions, is thus called into activity by any general exciting influence, and, if extensive, often reacts with great energy on the constitutional disease. Again, a local irritation frequently extends itself to the various functions of the system, generally affecting them irregularly and singling out a weak organ, which becomes a new seat of irritation, whilst the original evil receives back with interest, by the same channels of sympathy, the disturbing influence that it had engendered. This interesting subject has been ably treated by Abernethy, Travers, and other eminent writers on medical surgery; and its importance is generally admitted in modern practice. We here allude only to its principle, which is not dissimilar to that of the cases already noticed.

We have hitherto represented irritation as the result of a stimulus or exciting influence, whether the undue relation reside in the irritability of the part, or in the external influence applied to it. The nature of this relation is necessarily obscure, as it is involved in the mystery of the properties of organized matter; and we must therefore at present rest contented with observing the fact. But there is another source of irritation which it is important to notice, equally proceeding from the operation of a prevailing law of organized structure. There is in the living powers a kind of resiliency, or disposition to reaction, which manifests itself after the application of any influence that tends to depress or destroy them; this property often converts sedative into indirect irritants. Thus cold is in itself a sedative; but the reaction, which succeeds to its application, renders it a fertile source of inflammation and irritation. The worst mechanical injuries and severe burns and scalds are likewise sedatives in their immediate effect; and when extensive, this is sufficiently apparent in the syncope, suspension of sensation and function, and even death, which they occasionally produce. There are many instances on record of death supervening on severe accidents, such as the crushing or tearing of limbs, compound fractures, violent blows on the head, epigastrium, or thorax, &c. in which it could not be ascribed to loss of blood, or mechanical injury of any of the vital organs. The death of patients under severe surgical operations without hemorrhage may be attributed to the same cause, assisted often by the powerfully sedative influence of fear and pain. A remarkable and instructive illustration of the influence of mechanical injury may be drawn from the experiments of Legallois, Wilson Philip, Magendie, and others, in which it appeared that violent and extensive injury done to the brain and spinal marrow of animals caused an immediate cessation of the action of the heart, whilst the removal of the whole or any part of these organs in a state of integrity produced no such effect. Bruising or roughly lacerating the brain, or forcing a coarse instrument into the spinal marrow, seemed in these cases to exert a positively noxious and sedative influence on the heart. A more intelligible cause of prostration is loss of blood; but this, although it certainly is so when syncope and death are its immediate consequence, is not, as we shall presently see, so complete and general a sedative as some of the other influences which we have named. Other evacuations and privation from food are essentially of the same nature, but the gradual manner of their operation gives occasion to various signs of reaction, which disguise their direct effect.

The immediate operation of all these causes (and they constitute a most numerous class, for contagious effluvia, malaria, septic and other pestiferous influences may be added to the list,) is unquestionably sedative, or that of prostration; and if the powers of the system should be insufficient to resist or rally from it, they succumb under it. This is the very reverse of irritation, yet, strange to say, it has been commonly confounded with it; and it is when applied in this way to such opposite affections, that the word has lapsed into an indefinite acceptation. If the powers of the system are not subdued by the prostrating or sedative influence, there will then be reaction, in which they usually tend to pass the limit of moderation and regularity, and irritation and excitement ensue in the functions, various in kind and degree, according to the share of power which they severally retain. This appears to be a general rule in the animal economy, and we are not required to go further for an explanation of the reaction which forms a prominent part in many diseases. This reaction may be partial and injurious, as where it displays itself in convulsions, vomiting, hiccup, palpitation, cramps, &c. These symptoms have been called indications of prostration, and so perhaps they may be admitted to be with regard to the system at large, but certainly not in respect of the organs which they affect,

in these they are unequivocal signs of excitement or increased action. They are proofs of impotent and indiscreet reaction, and if not seconded by a reanimation of the organs more immediately concerned in the support of life, they exhaust the excitability of the system, and accelerate the extinction of life.

Another remarkable symptom of reaction is rigor. The addition of this sign to those already mentioned implies a greater degree of power in the system; and in many instances it precedes the development of the highest degree of reaction. Thus it is the first sign of fever, in which it is followed by a series of irritative movements of an intense and general kind. On the other hand it is the symptom of healthy and moderate reaction from syncope; and it frequently succeeds to the sedative impressions of cold without any violent irritation ensuing. It may be represented to be a slight convulsive motion, the object of which is to give an impulse to the circulation of the surface. When reaction becomes more general and perfect, it verges on fever, which may be inflammatory or nervous, according to the prevailing strength of the sanguiferous or the nervous system. But it is to the degrees short of fever and inflammation that we here restrict the application of the term irritation, and in these we find many, but not all, of the functional disorders which attend fever. There is a marked perversion of the functions of circulation, respiration, and digestion. In the former we see a quickened and irregular pulse, with deficiency of force and firmness in the heart's action; whilst alternations of pallidity and flushings betoken an equally irregular tonicity of the capillary vessels. The breathing is anhelatory and distressed; and this sometimes depends on the irregular state of the circulation, and sometimes on the irritation affecting with spasm the bronchial muscles. The powers of digestion may be often said to be almost annulled; a total inappetency for food marks their defect; and we need only allude to the loaded state of the tongue and to the vitiated excrements, as a presumptive proof of the existence of an adequate cause in the depraved state of the visceral secretions. The sensorial functions are likewise variously affected by any irritation extensively present in the body. The sensation and perceptions are commonly exalted and acute, while the other mental powers are below par; hence an irritability of temper and depression of spirits are generally observed; and the loss of balance sometimes amounts to delirium, which is usually of the morose or angry kind.

In the various symptoms that are thus presented in diseases of irritation, we should err were we to expect to trace constantly the features of excitement. It is the loss of balance which is most apparent; and although there must be some undue and misdirected excitement or irritation in some part of the system, the remaining functions will generally (but not necessarily) suffer from prostration and weakness. The more general states of fever and inflammation, through the vascular system which they essentially affect, in their marked and acute forms, entail irritation and excitement of a more equally diffused kind; but irritation, as we consider it, may be confined to a function or organ, while the remainder of the system is suffering from decided asthenia. Thus the stomach and bowels may exhibit irritation in profuse secretion and inordinate movements, whilst other secretory and motory organs are in a state of complete inactivity and prostration. The mamma and the testis sometimes present a form of irritation in an excessive sensibility or constant pain, without any apparent excitement or weakness in their vascular structure. It is in fact a degree of relative, not absolute weakness, that characterizes irritation through all its range of degrees. The excitement takes effect partially only, and the parts unaffected do not contribute to carry the orgasm through a series of processes by which it is at length exhausted, as in the case of inflammation; but if the cause continues, the irritation may persist for an indefinite time, occasioning more or less mischief and disturbance, according to the importance, in the system, of the balance which it destroys. In the greater number of instances of irritation, the vital powers are enfeebled; and this constitutional weakness is the reason why the excitement does not become general and pass to the state of fever or inflammation; but absolute debility is not essential to the existence of irritation; since the most perfect inflammations and sthenic fevers commence with simple irritation, and this is a stage in all cases of reaction. The persistence or protraction of irritation certainly implies relative, and in most instances, general weakness; for the existence of power would lead either to general reaction and restoration of balance, or to the more powerful process of pyrexia and inflammation. The operation of the morbid virus received into the system through wounds in dissection strikingly illustrates two modes of irritation. Its local effect is that of direct irritation, while its action on the system is that of powerful prostration, against which the feeble and irregular reaction of the vital forces develops another kind of irritation. If in such a case inflammation begins in a part, it seldom exhibits the vigorous and decided character of healthy inflammation; but occupying the capillaries principally, and unseconded by any energetic action of the other parts of the vascular system, it takes on an erythematous form, while the effusions are serous or sanious, destitute of coagulable lymph, the plastic effect of which tends to limit and restrain phlegmonous inflammation. The variety of signs which this complication of disorder may present is very considerable; but they principally depend on these two causes—the noxious or sedative influence of the poison, and the irritation resulting from an imperfect and irregular reaction of the vital powers against it. For a full and interesting detail of examples of this kind, we must refer our readers to the work of Mr. Travers, before quoted.

We may, in conclusion, sum up the kinds of irritation under three heads:—

1. Those caused by *direct* irritants or stimuli, whether acting immediately on the part, or mediately through the nerves.

2. Those caused by a preternatural irritability, which, independently of any new exciting influence, renders the relation of ordinary circumstances a source of irritation.

3. Those caused by *indirect* irritants, or those

influences which, although in themselves prostrating or sedative, become irritant through the reaction of the vital powers against them.

This division must be admitted to be in some measure artificial, inasmuch as few examples of irritation occur in which one only of these kinds of causes prevails. They, particularly the first and the second, frequently become engrafted on one another, and occasionally all coexist; but still the greater number of cases are sufficiently stamped by the prevalence of one or other of these kinds of irritation, to render the distinction available in practice.

1. **Diseases of Direct Irritation.**—Of this kind is the disorder resulting from all sorts of slight mechanical injury, whether by contusion, super-extension, puncture, incision, or laceration; from extraneous substances, tumours, effusions, and accidental productions; chemical irritants, too long retained or vitiated excretions; dentition, crudities, and worms in the alimentary canal, calculus in the urinary or biliary passages, and many others. Irritation in all these cases is undoubtedly the result of a reaction of the vital powers, the object of which is salutary, being the removal of an irritating matter or the reparation of an injured part. Whether there be a state prior to reaction which can bear the name of prostration in these cases, as well as in those of the third class, is a matter of merely speculative and not practical interest, since we can detect in their history no other than a direct mode of irritation. The reparation of an injured part depends mainly on the vessels obeying the impulse of irritation: and unless there be a peculiar defect of power in them, the disorder passes into the more healthy state of inflammation. Where this defect subsists, there may be either the imperfect inflammatory action which we see in erythema and erysipelas, or no inflammation at all, and then pain and disordered function or secretion are the signs which attend irritation. It is for the same reason that injuries of tendons, ligaments, fasciæ, and other fibrous membranes, commonly exhibit more of irritation than of inflammation; they are not liberally supplied with vessels, and the irritation, instead of speedily terminating in the reparatory or suppuratory process, lingers longer in the part, with pain, serous effusion, &c., sometimes exciting, sympathetically, severe constitutional derangement, and even tetanus. In the irritation resulting from the application of mechanical or chemical irritants, the salutary object of the reaction is more apparent. Thus, if a grain of sand or salt fall on the conjunctiva, the pain and irritation excite a copious secretion of tears, the tendency of which is to remove the offending matter. Mucous membranes, when irritated, throw out viscid mucus to protect themselves. When a thorn or a needle penetrates the skin, an irritation is produced, which tends to inflammation; this by effusion limits the irritation to the immediate vicinity, and by suppuration removes the irritating matters. But, on the other hand, irritation may fail of its salutary end in all these instances. The grain of sand may remain lodged; the mucous effusion be inefficient as a shield; and the vascular power may be insufficient to effect the process of the expulsion of the thorn or needle; and then the irritation becomes a disease of more permanent character. So worms in the intestinal canal will irritate the membrane of the bowels in every variety of way but a salutary one. Thus they may affect the nerves, occasioning by sympathy grinding of the teeth, convulsions, disordered appetite, various pains, palpitation, &c. The vascular system may likewise be excited, and mucus poured out in great quantity, the peristaltic motion accelerated, without dislodging the offending bodies; whence diarrhœa, with tormina, depraved excretions, thirst, atrophy, and other constitutional disorders, may ensue. The same description will apply to scybalous fæces lodged in the cells of the colon. Indigestible food and excessive acid or acrid secretions in the stomach irritate it in a variety of ways: if the sympathies of the muscular apparatus related to it are quick and susceptible, vomiting is excited, and the end of the irritation accomplished. But if these are not sufficiently roused, the irritation will cause other sympathies and uncomfortable feelings, both bodily and mental; whence arise gastrodynia, pain in the chest, incubus, palpitation, asthma, headach, vertigo, hypochondriasis, &c. The signs of irritation may proceed from such a variety of organs that it appears to be in a manner reflected from one to another. Thus irritation in the bowels is transmitted to the brain and spinal marrow, and from thence developes its effects on the voluntary muscles, producing spasms, convulsions, or chorea. If the original irritation persist long in this direction, it may become fixed on the nervous system, and there continue long after the irritating influence has been removed from the intestines; the disorder of the nervous system may then be considered to be of the second kind of irritation, that, namely, of increased irritability. Calculus of the urinary organs frequently produces irritation of a still more disturbing and unprofitable kind, which has worn down the feelings and functions of many a frame. Dentition is another fertile source of irritation in the bodies of sensitive children. As long as this is restricted to the production of a copious flow of saliva or a moderate diarrhœa, it can scarcely be said to be prejudicial; but it not unfrequently amounts to general disordered secretion, wasting diarrhœa, and atrophy, convulsions, and paralysis; none of which effects tend in any intelligible way to promote the progress of the tooth through the gum. Tumours in the brain or spinal marrow may excite epileptic convulsions, chorea, paralysis agitans, &c. Accidental productions, as tubercles, produce various signs of irritation, both local and sympathetic. Thus, in the lungs they occasion cough, in the bowels diarrhœa, &c., whilst their presence almost always irritates the heart and quickens the pulse. Foreign bodies or splinters of bone in the substance of living structure frequently occasion severe irritation, with little or no decided inflammation. It may declare itself by pain and spasm in the part, and in the system by disorder of any of the functions, quickened pulse, hurried breathing, impaired digestion, delirium, convulsions, tetanus. Pus confined within the proper sheath of a tendon, under a fascia, or within any dense and unyielding tissue, may produce similar phenomena.

Such are examples of direct irritation, and many others might be adduced; as the history of numerous diseases, medical and surgical, abounds in instances of the same kind; but we do not profess to enter into details, and enough has been said to illustrate the principle. Nor shall we do more than allude to another important and extensive cause of irritation, which we cannot hesitate to call direct,—inflammation. It is a cause not only sympathetically, or through the intervention of the nerves, but likewise by mere contiguity. Thus inflammation of the pulmonary pleura excites irritation and consequent inflammation in the corresponding part of the costal pleura; and the same thing gives origin to the adhesions observed between the heart and pericardium, and the peritoneum in its various points of contact. The physical nature of this mode of the propagation of inflammation is involved in much obscurity; and although there are not sufficient grounds to identify it with electric or galvanic action, it is obviously something beyond vascular or nervous communication. But through sympathy an organ or part affected with inflammation produces irritation in various other organs; this is fully exemplified in what is called symptomatic fever, which can be referred to no other principle. It is, moreover, especially remarkable in the sympathetic relations which subsist between particular organs, as the mucous membrane of the stomach and bowels and the brain. And here, while we would acknowledge the truth and importance of the views of M. Broussais on these points, we would insist still on the propriety of distinguishing between inflammation and irritation. The secondary or sympathetic irritations may truly pass into inflammation; but they more generally fall short of it, and therefore require a different treatment; and it is a point important to be observed, that instead of being in proportion to the intensity of the primary inflammation, they are often most prevalent when this is very slight. Thus the cerebral and general irritation accompanying well-marked gastritis is considerably less than that which gastric derangement, or what the French call "embarras gastrique," will produce. It would, perhaps, more nearly represent the reality if we say that the sympathetic disorder is in proportion rather to the irritation of the organ primarily affected than to the intensity of the inflammation. This predominance of irritation over inflammation, although occasionally occurring in the robust, is a character more remarkable in individuals in whom the nervous system has the ascendency, whether by natural constitution, or in consequence of the depression of the vascular power by evacuations or inanition. It is thus that in delicate females visceral inflammations are often accompanied by irritation and disorder quite disproportionate to their intensity or extent.

Certain mental emotions are frequent causes of bodily irritation, and they act in a variety of ways. Anger, joy, and surprise, (which act as general stimulants on a healthy body, and if they tend to produce disease at all, it is congestion or inflammation,) when the bodily powers are in an enfeebled state, become direct irritants, and develop that partial and irregular excitement among the functions and sensations which we understand by the word irritation. They exert their stimulant relation almost exclusively on the nervous system, which in this condition of the body has already a disproportionate ascendency, and they may thus greatly increase that loss of balance which is so much opposed to the state of health. Thus we see the necessity of excluding all such influences from those whose functions are in that state of weakness or depression which continually verges on derangement; such are convalescents from fever and other severe diseases. Grief, fear, and anxiety are indirect irritants, and must therefore be referred to the third head.

2. **Irritation from Excessive Irritability.**—We have already adduced examples of this kind in the case of the stomach after the evacuation of an emetic during pregnancy, or suppression of urine, and under the influence of concussion of the brain, and other injuries or shocks to the system. The intestines, when once excited by an irritant, sometimes present a continuance of irritation apparently from the same cause; and the irritability of the urinary bladder is known to be morbidly exalted in the diseases of the adjoining parts. Inflammation is, however, the most common cause of excessive irritability; and it is in some measure a question whether the above examples may not be referred to a state more or less akin to it. But we see parts sometimes remain permanently irritable without any obvious increase of vascularity; and as there is reason to suppose that sensibility is not always in proportion to the number and size of the vessels, it would not seem just to attribute the excessive irritability of an organ always to inflammation or even to congestion. Mr. Travers considers that the irritable joint, breast, testicle, and prostate gland, give no evidence of inflammation. He records instances of irritable breast and knee joint, attributed originally to needles having entered the parts, which continued painful many months after the extraction of the needles, in the total absence of inflammation. The facial nerves in those affected with tic douloureux present examples of excessive irritability; a draught of cold air or the heat of a fire is enough to irritate them and the adjoining muscles into pain and spasm. The bronchial muscles are inordinately irritable in those subject to nervous asthma; and trifling causes, such as the effluvia of a stable, excite them to spasm. Other idiosyncrasies might be quoted in proof of excessive irritability as a cause of irritation. After an irritation has been transmitted for a considerable length of time from one organ to another, the latter sometimes adopts the habit, and continues to show signs of the same disorder after the original irritating cause has been removed. This is instanced in chorea, arising from feculent accumulations or disordered secretions in the intestinal canal. When these have been removed or restored to a healthy condition, the chorea sometimes continues, and can only be removed by remedies directed to those parts of the nervous system in which the irritation has become fixed.

The uterus in the irregular performance of its periodic function, is frequently the seat and focus of irritation. The nervous excitement, or *innervation* as Andral terms it, by which a flow of blood is called to this organ at particular times, may fail

of its purpose, and instead of being relieved by the establishment of the catamenial discharge, displays its effects in the various forms of what is called hysteria. In this there may be or there may not be local plethora; if there be, the fault of relief must be in the secernent vessels of the uterus; but if there be not, the defect is probably in the sanguiferous system, so that they do not answer to the call. Each of these cases has its separate class of symptoms originating in irritation; but as hysteria and other derangements of the uterine function are fully considered under their respective heads, we do no more than name them. Many other examples might be adduced to illustrate this mode of irritation; particularly in that numerous class in which a congestion or increased vascularity is the cause of excessive irritability; but it is unnecessary to go further. It is by producing a state of this kind, that direct irritants may become causes of this second order of irritations. We may remark that many of the following class of irritations might perhaps be referred to the same head.

3. Indirect Irritation, or the Irritation of Reaction. — In developing the principle of this mode of irritation, we have already cited many instances of its occurrence: these may be greatly multiplied, for they are as numerous as the sedative or prostrating agencies to which the animal frame is liable; but it will be sufficient if we notice generally the forms which they most commonly present. There is probably a successive gradation of conditions from the slightest sign of partial reaction from the state of prostration, such as vomiting, rigor, and convulsion, up to a decided and violent reaction, bordering on inflammation and fever. All these we would designate as degrees of irritation dependent on the same physiological principle, and deriving the variety of their aspect from the number and force of the functions which take part in the reaction. We sometimes see it confined to a single organ; thus the stomach shows it by vomiting, the diaphragm by hiccup, the brain by delirium; whilst all other organs may remain in the state of prostration. Of this description is the effect of violent and extensive injuries or burns, and severe operations, in which the powers are almost overwhelmed by prostration, and the partial effort at reaction, instead of counteracting it, contributes to render it complete and fatal. The pulse here is quick and threadlike, the respiration short and suspirious, frequently with a general rhonchus throughout the chest; if there be no delirium, the intellectual and sensitive faculties are in a state of hebetude approaching to stupor; the pupils are dilated, and the eyelids half closed; the countenance pallid or livid; the surface and extremities cold; the secretions, if not suppressed, are unnatural; and the sphincters often fail in their office. All these are signs of direct prostration, and among them the irritation of reaction may declare itself in a solitary symptom, and in none more commonly than in vomiting, which is often indomitable to the last, and greatly hastens the fatal event. It seems to proceed from extreme irritability of the stomach, which rejects the blandest liquids. A low delirium, with various hallucinations of the perceptions, may equally accompany this state; it is a sign of the irritation of reaction in the brain, and is prejudicial both in being misplaced reaction, and by leading to bodily efforts which add to exhaustion, and not uncommonly prove instantaneously fatal. Convulsions arise in the same way, and produce similar effects. Such is exhaustion with the lowest signs of reaction. In other cases irritation takes a larger share in the diseased state consequent on the injuries under consideration. Thus, after rigors, the pulse may become sharp and bounding, with throbbing in the head; the eyes glassy, with contracted pupils; the delirium fierce, or there is great restlessness and morbid sensibility: spasms may occur in various parts of the body; there may be pain in all degrees and positions; the heat may be partially increased, although the extremities are generally cold. Here, although beginning in prostration, the chief features of the disease are those of misdirected and excessive reaction. They border very closely on fever and inflammation; and it would be rash to say that they are always distinct from these states: but although the delirium and exalted sensibility are sometimes so marked as to give suspicion of the existence of phrenitis, examination of the brain after death discovers no sign of increased vascular action further than some turgescence of the vessels, which is totally disproportionate to the intensity of the symptoms. Other organs, the lungs, the heart, the stomach and intestines, but particularly the serous membranes, are occasionally the seat of this kind of irritation, which puts on the semblance of inflammation; but less commonly in reaction after local injuries or operations, than after prostrating causes which have a more diffused seat in the system, such as cold, loss of blood, and inanition. The general tendency of all these irritations is to exhaust, and unless controlled and counteracted, they wear down and destroy the remaining irritability of the system, and death necessarily ensues.

It is the continued impression of a sedative or prostrating influence that renders reaction imperfect, and converts it into an injurious irritation. Thus the powers in general may be unable to rally after the first shock of any severe injury or operation; but this inability is frequently dependent on some additional sedative influence, bodily or mental. Fear and anxiety are most powerful in this way; and instances are on record in which operations, trifling and favourable in their surgical relation, have led under their influence to a fatal result. Women have died after successful and natural parturition, barely from the effect of a presentiment that they would die. To such instances cited in Mr. Travers' work before mentioned, he adds a case of the death of a lady after a labour protracted unusually by the evolution of a polypus after child-birth; and another of a gentleman who died in twelve hours after the escape of the contents of the stomach by perforation into the peritoneal cavity—ascribing these fatal events to the sudden, extreme, and unremitting pain: but we question whether they may not be as fairly attributed to exhaustion from muscular effort in the first case, and in the latter to the prostration of the heart's power by the severe and extensive injury to the peritoneum, as in other cases of acute peritonitis. Pain, though commonly at first a

powerful irritant, when exceedingly severe occasions syncope, and by fatiguing the powers otherwise produces a prostrating effect: in this way it will tend powerfully to subdue the disposition to general reaction. It implies the worst species of mental excitement, which entirely prevents the repose essential to restorative reaction; but as we sometimes see the body bear pain even in its greatest degree with impunity, and as we know that a certain integrity of the function is necessary for its continuance, we can scarcely look on it as being ever alone a sufficient cause for fatal prostration. The sedative influence of grief and fear is so decided that they may not only aid other causes, but by themselves destroy by prostration; and this may, as in other cases, be with or without irritative reaction.

But the most remarkable species of causes of irritative reaction are those which depend on inanition, whether arising from bloodletting or other evacuation, or from imperfect nutrition. We owe to Dr. Marshall Hall the first distinct notice of these morbid affections: his observations have been confirmed by Dr. Abercrombie, Mr. Travers, Dr. Gooch, and other subsequent writers; and he has since given a fuller account of them in his "Researches on the Effects of Loss of Blood," a work recording some new facts of great practical importance.

The immediate morbid effect of loss of blood, if extensive, is the same as that of the other prostrating influences which we have mentioned, syncope, coma, convulsions, and delirium. The two latter, although they appear closely allied to the others, we cannot but view as different in their nature, and as resulting either from a partial effort of reaction, or from a remnant of local power, preponderating unduly over general prostration. They most frequently occur where the excessive loss of blood has been gradual, as by atonic hemorrhage, epistaxis, by bloodlettings often repeated, or through a small orifice and in the recumbent posture. The gradual draining of the system in these ways, or by other excessive evacuations, such as continued purging, and by starvation, which have the same effect in the feeble, after the lapse of these symptoms frequently gives rise to a train of signs of irritative reaction of more prominent and decided form. There will be palpitation of the heart, with quick and jarring pulse, and throbbing of the carotids, aorta, and other arteries, and the auscultator will perceive a purring or grating sound in these parts. If this irritated state of the circulation continue, it will induce its effects on the sensations and functions; sensibility will be increased, with intolerance of light and sound, pain, throbbing, and noises in the head, an excited state of the mind amounting to delirium, a loaded tongue, and general disorder of the secretory functions. This condition, which is amply described by Dr. M. Hall in the work before quoted, and in the articles Bloodletting and Abstinence in these volumes, is a fair example of irritation in its characteristic form. Here is great excitement and disposition to act, but no power to regulate or support it: here are the nervous phenomena of inflammation without that permanent and powerful state of the vessels which can lead it to any of its usual terminations. The semblance of inflammation which it frequently presents often induces the practitioner to draw more blood; the evil consequences are sometimes immediate, syncope, convulsions, and death; and when there is a temporary amelioration, it is only a prelude to a worse return of irritative reaction So great is the real weakness in the midst of all the apparent signs of excitement, that the erect posture or any kind of exertion may prove fatal. It may terminate fatally also in a more gradual way, by passing again into the state of sinking or pure prostration; and here likewise it may put on a fallacious aspect in its resemblance to the signs of effusion on the brain. In children particularly, this imitation is so close that Dr. M. Hall has called it the hydrencephaloid disease. In favourable cases irritation terminates in subsidence and a gradual restoration of power, and with it a recovery of balance among the functions. But the irritation may pass into a chronic state, and of this description Dr. Hall considers puerperal mania, amaurosis, deafness, paralysis, &c.

The delirium, mania, and increased sensibility in those suffering from privation of food, recorded in several cases by Dr. Currie, Dr. Latham, Andral, and others, are obviously of the same nature of irritations of reaction; and in the pain of the head and stomach, and irritable state observed in those under the influence of a great and sudden lowering of diet, we see a more familiar illustration of the same kind. Similar symptoms often accompany the wasted and atrophied condition of infants unduly nourished, with whom the maternal milk disagrees, or whose powers of digestion cannot master the food that is given them; and they not unfrequently develop themselves in the asthenia lactantium, and in any form of undue nutrition. For further illustrations, see the articles Abstinence, Chlorosis, and Lactation (Diseases of.)

Treatment of Irritation.—Having described irritation as a general pathological principle rather than as a specific disease, our remarks on the remedial measures calculated to counteract or remove it must be equally in the abstract, and merely illustrated by prominent examples.

The removal of the irritating influence, if possible, is the most obvious indication in the cure of direct irritation; and in the slighter cases this may be a sufficient remedy. Thus, the removal of irritating matter from the stomach by means of an emetic; from the intestinal canal by a purgative; the counteraction of acidity by a dose of alkali; relieving by a stroke of the lancet the tension of the swollen gum in dentition, or of the integuments or a fascia in a superficial or deep-seated abscess, may amount to a complete cure of the various forms of irritation, which these causes severally occasion. But it is not always possible thus to reach the root of the evil; moreover, as we have already remarked, when once planted, the disease propagates itself so as in a degree to become independent of its first cause, and thus to belong to the second class of irritations. Hence it often becomes necessary to combine, with the measures directed to remove the irritating influence, others calculated to diminish irritability; and where the original cause is obscure or baffles our efforts, this is the only system of medication that can be pursued. This combination is the more expedient in intestinal irritation, as the remedies

suited to remove the offending cause in themselves for a time aggravate the irritation. Thus it is proper in such cases to give before or with the purgative some narcotic, such as hyoscyamus or opium, and further, if necessary, to allay the irritation of its operation by diluents, the warm bath, and other derivants. It is not easy to lay down any rule by which the relative importance of these measures can be decided; but the sedative plan is generally more requisite in proportion to the length of time and the degree in which the constitution has suffered under the irritating influence. Where the irritation is vehement, and disturbs in a serious degree the vital functions, it becomes of more importance immediately to allay this by temporising measures, than to rest solely on those which are more radical, but of slower operation. A child suffering from worms or accumulated fæces may die of convulsions under the additional irritation of a purgative before its evacuant effect can be obtained; but if this medicine be preceded by or conjoined with others calculated to soothe, such as hyoscyamus, Dover's powder, or the warm bath, according to the character of the irritation, its operation will be safe and seasonable. The purgative is, moreover, by the same means, often rendered more effectual for the removal of the irritating matter, since its slower progress enables it to act more generally on the canal, than where an excessive irritability hurries it precipitately through. So also, during the prevalence of violent spasm, an antispasmodic must often be promptly administered without regard to the duration of its effect. To give ether, laudanum, assafœtida, valerian, &c. in spasm of the glottis or bronchi, or in violent palpitation of the heart, may be, in relation to the cause of the irritation, a temporizing measure; but it is using time to good purpose.

We have enumerated inflammation among the causes of direct irritation, and we again allude to it for the purpose of remarking, that besides the removal of the cause itself, our attention may sometimes be usefully directed to the quieting of those nervous sympathies by which the irritation is communicated to the system at large. This, we apprehend, is the principle of the salutary operation of opium in continued fevers and the less sthenic forms of inflammation; and did we possess a medicine that should be sedative to the nervous system without exciting or disturbing the vascular, it would furnish a still happier and more satisfactory illustration.

There are many cases in which the source of irritation is organic, or beyond the reach of remedies; it is thus with tumours in the brain, spinal marrow, and other parts, accidental productions, cancer, and other forms of diseased structure; here our only resource is in measures which allay morbid irritability. We shall have occasion presently to revert to this subject; but we see no need to dwell longer on means for the removal of irritating influences: they vary with the nature and locality of the influence.

There is another mode of treating direct irritations, which it may be convenient to notice in connection with direct irritation, although it is more frequently applicable to the indirect kind, namely, by stimulating applications. In enumerating examples of direct irritation we named various mechanical injuries, and remarked that the object of irritation in these cases, the reparation of the injured part, is sometimes defeated, and the disorder prolonged in consequence of the low power in the vascular system, which is inadequate to take on the reparatory state of healthy inflammation. Here, then, an additional stimulus to the vessels, conjoined, if need be, with a sedative to the excited nerves, will often recall the irritation from its prejudicial wanderings through the system into a local and salutary channel. This treatment is obviously applicable only in cases where inflammation is not in itself a hurtful process, such as mechanical injuries and sores of the exterior, and especially burns and scalds. The efficacy of stimulating applications to the latter is now generally admitted, and we would attribute it entirely to this principle in all the moderate examples of these lesions. The extreme heat has so paralyzed or weakened the vessels, that although they may be entire and congested with blood, they require a new and powerful stimulus to bring them to that activity of function which the reparation of the injury requires. When a part has been disorganized, and is insusceptible of revivification, and the adjoining vessels are weak and inactive, stimulant applications are still more obviously indicated to excite that inflammation which is necessary to effect the sloughing or separation of the noxious dead matter from the living structure. We can see the utility of a similar treatment in other forms of external disease, where the inflammation is at once irritative and powerless.

We have already glanced at the treatment of our second order of irritations, that of excessive irritability, for the mixed manner of their occurrence renders it inexpedient to consider each kind quite separately from the other; but we return to the subject, in the endeavour, as far as is possible, to make this sketch of the principles of the treatment correspond with the preceding pathological history. Excessive irritability, as we have there remarked, most frequently depends on inflammation or some of the states akin to it, or (to use the more comprehensive words of M. Andral) hyperæmia in its several forms. In such cases relief is to be sought in the various antiphlogistic measures, applied of course with due relation to the organ whose morbid irritability is to be reduced; and thus evacuants, derivants, counter-irritants, and contro-stimulants, become remedies for irritation. These are considered in the article Inflammation sufficiently to supersede notice here, further than the remark that their anti-irritant may not always be in the ratio of their antiphlogistic effects; and where irritation predominates over inflammation, those are to be preferred which act on the nervous as well as on the vascular functions; thus, counter-irritants (and if they be admitted as a separate class, contro-stimulants also,) will avail more than mere vascular deplctories in fulfilling the indication in view. For example, in the vehement irritations connected with slight phlogoses of the mucous membrane of the lungs and of the alimentary canal, (notwithstanding Broussais' positive assertions to the contrary,) tartar-emetic frictions for the former, and sinapisms and blisters for the latter, are far more efficacious than local or general bloodletting. The irritations of serous membranes,

which in persons of mobile sensibility frequently present the semblance, although they partake little of the real character, of inflammation, likewise receive most relief from this description of antiphlogistic treatment. The contro-stimulant or sedative influence of cold directly applied is exerted equally on the vessels and nerves, and it would be, doubtless, a powerful means of subduing irritations, were it a more manageable agent; as it is, we see its beneficial influence in the relief afforded to cerebral irritation, and in those of the limbs by applications of ice and cooling lotions. The expediency of using it, (as do the Broussaians) in abdominal and thoracic inflammatory irritations, is very questionable: the risks of repelling the inflammation more inwardly, and of its being aggravated by reaction if the application of cold is unsteady or insufficient, besides the obvious injury to the system of continually abstracting from organs that degree of heat which is almost necessary to their life, are surely sufficient objections against a practice that is far from being generally recommended by the experience of its advocates. External heat, whether dry, as applied by hot flasks, bricks, or air, and acting as a rubefacient, or combined with moisture in fomentations, baths, or poultices, and proving revulsive and sudorific, is a much less exceptionable remedy for internal irritations. In its moderate degrees the latter are more suited to inflammations, as their effect is principally on the circulation, which they soothe and equalize; but in its highest tolerable degree, heat produces a strong impression on the nervous system; very hot flasks, or flannel wrung out of water almost scalding, are among the most powerful of antispasmodics or local anodynes, and we have seen them produce perfect and immediate relief in the irritative pains of colic and dysmenorrhœa, where many powerful narcotics had failed.

As we are now verging on the subject of means directed particularly to lower nervous irritability, we may premise that there are some narcotic or sedative remedies which, if they do not act as such on the vascular system likewise, do not stimulate it; they are, therefore, often admissible in inflammation itself, and are the more strongly indicated when it exhibits the character of nervous irritation. Of these, none for safeness and general applicability ranks before the hyoscyamus. Mr. Travers says, "In the ruffled states of the system generally, but especially in the over-active state of the vascular system, there is a charm in the operation of henbane altogether peculiar. It is feeble as an anodyne, feebler as a soporific, but 'not poppy nor mandragora' soothe and still so unexceptionably as henbane." This remark, although true, requires a comment; the over-activity of the vascular system here alluded to is not one of inflammation, but of irritation, dependent on excess of nervous irritability scattered through the different organic sympathies; and it is in its sedative influence on these that the charm of henbane consists; for it exerts little or no effect on inflamed vessels, that are, as it were, over-active in their own strength. We may almost say that on its little interference with the vascular system its general eligibility depends; for, restraining no secretions, it can advantageously be given alone or combined, without the risk of purchasing temporary relief at the expense of that balance of functions which is so essential to health; and unless where pain and excited sympathies are useful as guides in the employment of more active remedies, there is scarcely an instance of morbid irritation unfitted for its use. The main fault of hyoscyamus is its weakness as a narcotic; it not unfrequently fails of its effect, and, perhaps sooner than other remedies of the same class, loses its power by continued use.

Of the other remedies of this class we may mention favourably conium, belladonna, colchicum, digitalis, and hydrocyanic acid. Their fitness in various diseases is less extended than that of the medicine already named; and it is particularly restrained by their greater liability to disagree with the stomach. The two first approach in their properties most nearly to hyoscyamus. The three others exert a decidedly sedative effect on the vascular system, but rather through an influence on the heart, the force and number of whose pulsations they diminish, than from any action on the vessels at large. Their beneficial effect is, therefore, best seen in irritations of this organ and of the lungs, which stand in so close a relation to the heart. The directly sedative influence of hydrocyanic acid is, however, sometimes remarkably evinced by its allaying the morbid irritability of the stomach; and it is successfully applied externally to allay the irritation of prurient eruptions. Colchicum is supposed to possess a specific sedative power in the irritations of gout and rheumatism. Whether this may depend on its carrying off through the kidneys an irritant matter from the blood is uncertain; but the diuretic effect of this remedy and of digitalis should not be overlooked. Conium and belladonna, when the system can bear them in sufficient doses, are sometimes very beneficial in allaying irritation of the pulmonary system, whether manifesting itself in spasm of the bronchi, or in an excessive irritability of the mucous membrane, exciting cough. The smoke of stramonium and of tobacco enjoys a similar reputation, but it is decidedly stimulant to the vascular system. Poultices of the recent leaves of various narcotic herbs, but particularly conium and belladonna, are very efficient in allaying the irritation of unhealthy ulcers: the leaves of the latter in form of ointment show great power over both vessels and nerves, in relieving and preventing the chordees of gonorrhœa.

We pass over others of lesser note to the chief of narcotics, opium. This medicine, although under certain circumstances the most sure and most powerful of anti-irritants, has so many ulterior effects, that more than any other it requires judgment in its exhibition. Its first effect is to stimulate the vascular system, and this is sufficient to exclude it from all those instances of sthenic inflammation where it is wished to retard or arrest rather than to hasten this process. But in the asthenic phlegmasiæ, especially where nervous irritation predominates, the administration of opium is counter-indicated only by the ulterior effects which it may have in arresting the secretions. Combined with ipecacuanha, with antimony, and especially with mercury, it ceases to be liable to this objection, and its operation is often in the highest degree salutary. Even where

it is wanted as a pure anti-irritant, to reduce morbid sensibility in the nerves, we should always prefer it in combination with ipecacuanha, which seems to equalize without injuring its narcotic virtues; and in further combinations, it is not common to experience from this compound the inconveniences that frequently result from laudanum or opium. The muriate and acetate of morphia, equally with Battley's *liquor opii sedativus*, enjoy the reputation of a purer sedative property than the common forms of the drug possess; but unless where a speedy effect is desired, there are few cases in which we would not place greater confidence in Dover's powder, or tantamount combinations of ipecacuanha and the aqueous extract of opium. It is an almost indispensable adjunct to purgatives in violent gastro-enteric irritation where hyoscyamus would be insufficient; and if the stomach will retain it, it seldom fails to quell the excessive disturbance that sometimes follows drastic and unguarded purgation. In dysentery, and in more chronic forms of excessive irritability of the intestinal canal, the proportion of ipecacuanha may with advantage be doubled or quadrupled, as in the dose of one-fourth or one-eighth of a grain of extract of opium, with one-half or a whole grain of ipecacuanha, repeated according to the urgency of the symptoms.

We must notice a more obscure class of remedies, alteratives, which, whatever may be their mode of action, are unquestionably entitled to a place here. Under this unscientific but convenient title, we reckon the various non-purgative forms of mercury, whether simple or combined with opium, those of antimony and ipecacuanha in acute diseases, and in chronic disorders minuter doses of the same, sarsaparilla, mezereon, chalybeates, and a host of other medicines. The efficacy of the first-named of these in restraining and subduing inflammatory action would obtain for them, among the disciples of the new Italian doctrine, the appellation of *contro-stimuli*; but this, like cutting the Gordian knot, is only substituting a bold stroke of hypothesis for a solution of the difficulty. It is not impossible that tartar-emetic and mercury may exert on the coats of inflamed or irritated vessels such an influence as directly neutralizes or subdues their disorder, and restores their healthy function; but this is a large assumption to take for granted; and in the absence of any sort of positive proof, we think it safer and as philosophical to arrange the remedies in question under the modest title of *alteratives*. These remedies are powerful in subduing irritation; and on the basis of the views which we have given of this morbid state, we might equally well frame an hypothesis that they act by restoring a lost balance, and by equalizing the distribution of natural irritability. But we will content ourselves with remarking the fact, that mercury, antimony, and in a minor degree ipecacuanha, tend moderately and equally to restore all the secretions which inflammation and irritation arrest or pervert; whilst opium, deprived in this combination of its restringent qualities, happily allays the excited sensibilities and sympathies of the nervous system. The alteratives prescribed in chronic irritations, although in greater variety, probably act on the same principle; and, perhaps, the exhibition of what are called alterative doses of blue-pill, Plummer's pill, ipecacuanha, dandelion, and sarsaparilla, and mineral waters in chronic diseases of the viscera and skin, is more generally acknowledged as an appeal to the various secretions.

Before passing to the last class of remedies, tonics, we would advert for a moment to the salutary effect of friction and exercise in allaying morbid irritabilities of a part of the system. They hold an intermediate place between alteratives and tonics, and in affinity with either they well merit consideration. Friction, steadily and moderately applied, is an efficient anodyne. Although injurious in acute inflammations, it allays in a wonderful manner various nervous pains, spasms, and other disagreeable sensations connected with irritation and irregular circulation, and it is a valuable auxiliary to anodyne applications. It is an alterative to the vascular system, inasmuch as it removes congestions and obstructions, and promotes healthy circulation and secretion; and in the regular continuance of these effects by exercise, increased by the contact of pure air, consists the tonic power of these hygeian agents.

The utility of tonics in subduing morbid irritabilities will, if we mistake not, be sufficiently apparent from the pathological views which we have endeavoured to expose. Agents which give tone and strength to the vascular system will destroy the preponderance of that nervous mobility which is the basis of irritation. Under their prosperous influence, disposition and power to act will go together, and within due bounds produce the harmonious balance of even health. Whether certain of them possess a specifically sedative property towards the nervous system, or whether this is their secondary effect after their tonic and astringent influence on the vessels, is beyond our means of decision; but the fact is not less ascertained than important, that the continued use of nitrate of silver or sulphate of copper will cure the epileptic irritations independent of organic cause, and often diminish them where the cause is irremovable, by lowering in the nerves their susceptibility to its impressions. Thus, likewise, bark, carbonate of iron, arsenic, sulphate of zinc, or subnitrate of bismuth, sometimes remove the painful or spasmodic irritations of tic douloureux, hemicrania, sciatica, chorea, and gastrodynia, which the most powerful anodynes, antispasmodics, and counter-irritants fail to effect. The stomach and intestinal canal, likewise, under the influence of a bitter tonic, will often lose various signs of irritation, which, however they may occasionally be accompanied by slight hyperæmia, or fancied inflammations, owe their being to weakness and want of tone. The cold shower or plunge-bath, or cold ablution, is another efficacious tonic; the more eligible, often, because, without loading the system with medicine, it rouses it to the exertion of its own powers in a vigorous vascular reaction, under the habit of which nervous mobility is physically forgotten, and ceases. But it is needless to add to examples which have been adduced only as illustrations of a principle.

We have, finally, to glance at the leading peculiarities required in the treatment of indirect irritation, or that arising in the reaction after prostration. The most obvious indication is to promote

and regulate the reaction, so that it may rise to the point of a general and equal recovery of function, without passing beyond it into a state of irritation or inflammation. The most common state which we have to deal with is that of irregular reaction, local and misdirected excitement amidst general prostration. Whether this excitement consist in convulsion, hiccup, vomiting, delirium, palpitation or cough, it is of the utmost importance that it should be subdued; and to effect this, it is of more avail to direct our efforts to excite the powers generally, by diffusible stimuli, than to attempt to quiet the local irritation by sedatives; for as the other powers rise from the prostration, this symptom will generally subside. But should this not be the case, and the local irritation be wearing down the strength, sedatives must be addressed to it: this part of the treatment will not differ from that of morbid irritability already considered. The point which characterizes the treatment of this form of disease is the necessity for counteracting the prostrating influence which paralyzes the plurality of the functions, leaving others in proportionate predominance. This indication resolves itself into the removal, as far as is possible, of this influence, and the further obviation of its effects.

Cold, and the resulting prostration, are removed by the same means, the gradual and cautious restoration of heat, beginning by frictions with snow, &c. and carefully restraining the disposition which is commonly manifested to excessive reaction; on this account diffusible stimuli are only sparingly admissible. See Cold.

The prostrating influence of a severe mechanical injury, as of a crushed limb or bad compound fracture, seldom ceases on the removal of the limb; on the contrary, the additional shock of the operation not unfrequently proves fatal. The absence of inflammation leaves the system open to the noxious influence of the shattered structure, which inflicts a stroke felt even after its removal. Were healthy inflammation soon excited, this would probably in a degree counteract or interrupt this influence; and we hazard the suggestion that stimulating applications made to the injured part previously to the operation, might, as in extensive burns, be of more avail than mere internal stimuli. The existence of inflammation in the system has been shown by Dr. M. Hall to protect it in a remarkable degree against the prostrating effects of loss of blood, and the same thing obtains in some measure in other cases of prostration; hence asthenic inflammation may be useful not only as proving power in the system, but also as a general tonic, imparting a stimulus to the heart and vessels. This remark is most applicable to surgical cases, in which inflammation is an important and necessary process; but we see in it also an explanation of the utility of artificial inflammations excited by sinapisms, blisters, and stimulant frictions, in failure of the powers from various causes, and in the state of sinking from any severe disease. Any of these measures, as local counter-irritants and general stimulants, often prove beneficial in arresting vomiting, hiccup, convulsions, or any other partial reaction, amidst general prostration. In the worst cases, however, they fail to excite inflammation; for the skin, like other parts, seems to have lost the attributes of vitality.

Of the diffusible stimuli fit to oppose the state of sinking or prostration, the most powerful are ammonia, alcohol, and opium. These are variously applicable, according to the degree to which the depression has extended. Ammonia is the most purely stimulant, and is, therefore, best adapted to cases in which there is least of local irritation, or where this manifests itself in spasms. The complete prostration induced by tobacco, digitalis, and other sedative poisons, and the asphyxia from the fumes of charcoal and sewers, are examples to which the stimulus of ammonia seems to be especially adapted. The carbonate of ammonia is the most common preparation, and it is conveniently combined with alcohol in the spiritus ammoniæ aromaticus, which is the form most agreeable to the stomach. It is to be borne in mind, however, that it is a chemical agent as well as a vital stimulant; and this circumstance precludes its being given to a very large amount. Spirits in the various combinations, brandy, wine, and ether, is a highly valuable stimulant; and it is the one perhaps most to be depended on in general prostration with irregular reaction. It exhibits some narcotic virtue in its property of quieting the irritated sympathies of this state, and is peculiarly serviceable in arresting the severe vomiting which often severely and fatally aggravates various forms of exhaustion. It is of the greatest importance to watch most assiduously the state of a patient who requires a large exhibition of stimuli of this kind, both to ensure their being supplied often enough, which in case of sinking must be done every five or ten minutes, and to diminish or withdraw them the moment they produce an effect on the circulation, lest they stimulate it beyond the point of moderate and general reaction into a state of febrile excitement. Opium, as it partakes largely of narcotic as well as of stimulant properties, is less adapted to the extremest forms of prostration than to those in which the irritability of the system is misdirected. In the state of sinking, when the respiratory function is failing with the rest, opium might have the effect of destroying the sensibilities and sympathies on which this vital process depends. But for the different partial irritations attendant on general weakness, particularly delirium, spasm, palpitation, and hiccup, opium is generally the most satisfactory remedy. Solid opium and its tincture are here the most expedient forms; and their stimulant effect is most fully developed by small doses frequently repeated. If the antispasmodic property is desired, larger quantities must be given; and it is truly astonishing what doses the system will bear when under the influence of spasmodic disease.

The first objects in extreme prostration are, to sustain the functions of respiration and circulation by diffusible stimuli, until there is a sufficient recovery of the forces to support these without further aid. The organic functions of secretion and assimilation then generally require some assistance; for the effects of the depressing influence sometimes manifest themselves on them after the circulation has been restored to some degree of vigour. Here alteratives and tonics come into requisition; and, as in direct irritation, they must

be variously modified and combined, in order to ensure the most equal and natural excitement of the several organic processes. Where the prostrating influence still remains in the system, counteracting vigorous reaction, and enfeebling or paralyzing all the conservative powers, these several remedies must be conjoined. Thus, under the noxious influence of gangrene, asthenic erysipelas, or poisoned wounds, it becomes necessary to administer wine or spirits, ammonia, opium, or camphor, with bark or sulphate of quinine, whilst the secretions are excited by calomel or blue pill. Bark has sometimes a signal power in combating with the depressing influences in question; and its efficacy may, perhaps, depend on the same property which renders it so complete an antidote to the causes of intermittent fevers.

The irritation of inanition, in respect to its symptoms, may require in great part the same treatment as that from other causes; thus sedatives to the nervous system, and the exclusion of all sensorial excitements, will be equally necessary. But the nature of the causes may modify the indications: as they consist in a loss from the system, the necessity of supplying nourishment for the reparation of that loss, giving to the assimilatory organs the aid of additional stimuli, is obvious.

It is necessary to be on our guard against the invitations which these forms of disease sometimes hold out for the use of antiphlogistic measures: these afford but temporary relief to the pseudo-inflammations which arise in this state, and which are more safely and effectually subdued by sedatives, a judicious supply of nourishment, and an exclusion of all exciting or disturbing agencies. Thus we may see a disease following extensive evacuations, which puts on the semblance of violent pleurisy, pericarditis, arachnitis, or hydrocephalus, often completely relieved by hyoscyamus or opium, with a sustaining nourishment, such as sago, arrow-root, or jelly, with small quantities of brandy or wine. The state of the circulation is the safest guide in the conduct of this treatment; as long as the pulse is weak or fluttering, with its quickness, and although sharp or jarring in its first impulse, yet leaves the artery in the intervals empty under the finger, the sustaining treatment must be continued, and local pains, palpitation, disturbance of the mind with beating or noises in the head, viewed as partial reactions, to be subdued by opium or hyoscyamus rather than by the lancet and evacuants. But if these symptoms have been relieved, and the pulse has recovered in a measure its steadiness and fulness, the spirits and other stimuli must be diminished or withdrawn, and the rest of the cure left to time and to whatever alteratives circumstances may suggest. These points are more fully described under the heads of the several diseases connected with this subject, and which have been already referred to.

The prophylactic treatment of those liable to irritations will generally consist of those means which, by giving tone to the vascular system, remove the preponderance of nervous influence or susceptibility. These are tonic medicines and a tonic regimen in general; but if there be already a loss of balance in the vascular system, it will be generally necessary to direct some alterative to regulate it. There are various circumstances of diet and regimen which tend greatly to engender a general morbid irritability; particularly an habitual and excessive indulgence in spirituous liquors, smoking, very strong tea or coffee, and opium-eating; close or crowded habitations, and a sedentary mode of life. Besides avoiding these predisposing causes, those who are of an irritable habit should rise early, and keep regular hours, use exercise in a bracing air freely, but not so as to induce much fatigue, live on food of the most wholesome and nutritious kind, and attend in every possible way to the promotion of equality and regularity of the functions.

C. J. B. Williams.

ISTHMITIS. (See Throat, Diseases of the.)

ITCH. (See Scabies.)

JAUNDICE. (Ἴκτερος, *icterus, morbus regius, aurigo, &c.*) Jaundice is a disease of rather frequent occurrence, characterized by a yellow colour of the eyes, skin, and urine, and by the white appearance of the alvine evacuations. In addition to these general symptoms, the malady is frequently attended with extreme depression of spirits, languor, inactivity, and watchfulness; with a bitter taste in the mouth, thirst, loss of appetite, nausea, or vomiting; a sense of fulness or other uneasiness, if not also actual pain, at the epigastrium; occasional shiverings and profuse perspirations; a distressing degree of itching in the skin, and rapid emaciation. The urine soon becomes of a deep mahogany colour, yet gives a bright yellow tinge to substances immersed in it. The state of the bowels is variable, being in some cases relaxed, in other cases confined, but generally acted upon with facility by mild aperients.

[Dr. Mackintosh (*Principles of Pathology and Practice of Physic*, 2d Amer. edit. i. 431, Philad. 1837,) states, that he has known several individuals affected with jaundice, who saw every object coloured. Most of the secretions are unquestionably tinged yellow, but not all. The colouring matter of the bile is rarely found in mucus or milk, for example. Yellowness of the conjunctiva is, however, one of the pathognomonic phenomena. Bile is, also, necessarily present in the blood-vessels of the retina; yet, as the writer has elsewhere said, (*Practice of Medicine*, 2d edit. i. 625; Philad. 1844,) yellow vision is not common. In the experience of one observer, Dr. J. P. Frank, it was noticed but five times in about 1000 cases. Much difference of opinion has existed in regard to the cause of the phenomenon when it does exist. The most probable supposition is, that the humours themselves are tinged yellow, and it has been suggested, that where vision is not yellow, they may have escaped the tinge. There is some plausibility, however, in the supposition, that tho cause may be wholly nervous, inasmuch as patients, in other diseases, as in typhus fever, without being in the slightest degree jaundiced, have seen every thing yellow. It is possible that different conditions may be occasionally concerned in the causation.]

The circumstances which *predispose* the system to an attack of jaundice are numerous. The melancholic or leucophlegmatic temperament, under mental excitement, whether of a pleasant or painful nature; an indolent mode of life, sedentary occupations, a full and stimulating diet,

and nabitual constipation, are among the most powerful.

The occasional or *exciting* causes of the disease are chiefly such as either suddenly stimulate the liver to an increased secretion of bile, or obstruct the free egress of that fluid. Thus, a heated almosphere, strong muscular exertions, sudden and powerful emotions of mind, spirituous or other fermented potations, a large and indigestible meal, fæces impacted in the transverse colon, pressure from a gravid uterus, may induce an attack of jaundice.

The *proximate* cause or essential nature of the disease evidently consists in an obstruction to the passage of bile in its course from the liver or gall-bladder to the duodenum, in consequence of which it either retrogrades into the blood-vessels of the liver, or is absorbed from the surfaces of the biliary ducts. There are many morbid conditions of the liver and its appendages, as well as of the adjacent organs, which may induce such an impediment. Not a few of these have been ascertained by the most conclusive evidence. Others, originally devised by the fertile imaginations of nosologists, and considered as adequate to the production of jaundice, have been successively handed down from author to author, not as merely probable causes, but as legitimate deductions from established facts. Instead, however, of specifying the greatest number of morbid conditions which may *possibly* give rise to jaundice, we shall endeavour to comprise, under a few leading divisions, those phenomena alone which pathology has clearly ascertained. Such, we think, may be conveniently arranged under four general heads.

1. Obstructions arising from biliary concretions or other altered conditions of the bile, as well as from worms, hydatids, or other foreign bodies.

2. Obstructions arising from diseased states of the liver, gall-bladder, or biliary ducts.

3. Obstructions arising from morbid conditions of the duodenum.

4. Obstructions produced by the pressure of enlarged contiguous viscera.

I. The first class of obstructions—**those arising from Biliary Concretions or other altered Conditions of the Bile itself**—have received an almost disproportionate share of attention from medical writers. The learned Heberden, for example, scarcely seemed to recognise any other causes of jaundice. There can be little doubt that a highly inspissated state of the bile may alone produce temporary jaundice. In some instances, after great depression of mind and torpor of bowels, the stools become white, and the skin of a dusky-yellow colour. Under the operation of a brisk mercurial purgative, the patient voids a quantity of dark, pitchy, viscid matter, of sufficient tenacity to be drawn out in threads. He becomes immediately relieved, the skin and the alvine dejections gradually resuming their natural colour Such cases we may warrantably refer to a thickened and vitiated state of the bile, which, in other instances, has been found of the same pitchy tenacious character while contained in the gall-bladder itself.

Biliary calculi unquestionably form a very frequent cause of jaundice. Their mere presence in the gall-bladder does not usually seem to produce either general or local inconvenience. Out of nineteen instances of biliary calculi, which occurred to Morgagni, besides four to Valsalva, in post-mortem examinations, not one had experienced jaundice. Yet a general failure of health has been observed, where, after death, no morbid appearance could be discovered except that of calculi in the gall-bladder. (Abercrombie on the Diseases of the Abdominal Viscera, p. 370.) Dr. Heberden remarks that, "in nearly twenty persons, a supposed pain of the stomach, which had frequently afflicted them for months or years, was at length joined by a jaundice." (Transactions of the College of Physicians, vol. vii. p. 171.) In those cases, it is probable that the occasional pain arose from some change in the position of the calculi in the gall-bladder. That they do not always remain in the bile-receptacle with impunity is clearly proved by the testimony of morbid anatomists. Soëmmering repeatedly found the mucous lining of the gall-bladder in a state of ulceration, occasioned by the irritation of the contained calculi; while other pathologists have observed a general thickening of its coats, and disorganization of its whole texture.

The *number* of calculi sometimes contained in the gall-bladder is almost incredible. Morgagni took out of one body 3646; and in the Hunterian museum at Glasgow, 1000 are preserved which are stated to have been extracted from one gall-bladder. The form and size of these calculi are very various. In a few instances they have nearly taken the shape and attained the magnitude of the gall-bladder itself, but generally, are from an eighth to a one-half of an inch in diameter, and of a polygonal form. (See Mr. Brayne's very interesting cases in the Medico-Chir. Trans. vol. xii.) The broken or divided portions of the larger calculi have sometimes corresponding convexities and concavities, proving that they were once united. And it is not improbable that the smaller calculi are often subdivisions of a larger mass, formed into distinct calculi before consolidation was completed. The sides of these calculi are often flattened as if from close contact and pressure.

The chemical and physical characters of biliary calculi have been already described in this work under the general title of Calculus. In that condensed but highly-interesting article the distinguished author has given a very perspicuous account of the more frequent forms of biliary calculi; but may not have thought it necessary to allude to one or two kinds of uncommon occurrence, which yet, we conceive, may prove of some importance in a pathological point of view. We, therefore, make no apology for introducing them in this place.

The first of these, as we are informed by Professor Turner, was discovered by M. Bizio, of Venice, in a peculiar fluid, quite different from bile, which was found in the gall-bladder of a person who had died of jaundice. It is of a green colour, transparent, tasteless, and of the odour of putrid fish. It is unctuous to the touch, may be scratched or cut with facility, and has a specific gravity of 1·57. M. Bizio has given it the name of *erythrogen*. (Dr. Turner's Elements of Chemistry, p. 656.)

Another remarkable kind of biliary concretion is described by Dr. Marcet, in the following words. "Within the last few days, I have seen and analyzed a large biliary calculus entirely different in its chemical composition from the above description, and, as far as I know, presenting a new fact in the history of these bodies. This concretion contained no adipocire (cholesterine), and consisted wholly of carbonate of lime tinged by bile. It was of a bright yellow colour. It was heavier than water, and measured two inches five-eighths in length, and two inches and a quarter in its largest circumference." (Marcet on Calculous Diseases, p. 151, note.) This extraordinary production was found in the gall-bladder of a dead body by Mr. Green, (now Professor Green,) demonstrator of anatomy in St. Thomas's Hospital.

The *formation* of biliary calculi is still involved in much obscurity. Many of the circumstances before enumerated as predisposing to jaundice generally, are found peculiarly to favour the formation of calculous concretion. Such are depressing emotions, deficient bodily exercise, a full diet and frequent constipation. Had biliary concretions been always found to consist merely of inspissated bile, there would have been no difficulty in conceiving how the want of exercise and similar causes, by favouring the retention of bile and the gradual absorption of its thinner parts, should ultimately lead to an actual concretion of the residual mass. And that this has sometimes occurred is sufficiently proved. Van Swieten, in his Commentaries, relates the case of a boy whose gall-bladder contained eight pounds of a thick sort of bile, consisting of a number of concentric strata, each stratum becoming firmer as it approached the circumference. There had, however, been no jaundice, although the stools were of a white colour. Biliary concretions, however, very rarely consist of bile alone; and even where an admixture of bile or a distinct stratum of bile does exist, the central portion is generally of a very different nature. Something more, therefore, than consolidation must take place. Either the original secretion of bile must be faulty, or, in consequence of long retention in the gall-bladder, it must undergo some changes by which its constituent parts become disunited or converted into new products. Probably these different states of bile occur in different cases; inasmuch as calculi are sometimes found in the liver itself, and inasmuch, too, as some kinds of calculi approach nearly to the known constituent principles of the bile, whereas others exhibit characters of a very dissimilar kind. May not also the mucous secretion of the gall-bladder become so altered in its nature, in consequence of the long retention of vitiated bile, as itself to furnish nuclei around which the dissociated constituents of the bile, or new formations from it, arrange themselves? The peculiar nature of some of the nuclei, as well as the effect of long-restrained secretions on other mucous surfaces, afford some countenance to this idea; although it must be admitted that the gall-bladder, from the adaptation of its structure to its peculiar function as a receptacle, is less likely to suffer from the detention of its contents than other mucous tissues exposed to the long-continued contact of their secretions.

An inquiry into the power by which biliary calculi are propelled forward necessarily involves some interesting points connected with the structure of the gall-bladder and the biliary ducts, which would lead us into a discussion somewhat foreign to the practical object of this paper. We shall merely remark that the effort of vomiting, whether spontaneous or otherwise, has probably a considerable influence in the extrusion of these concretions. Dr. Pemberton, indeed, does not ascribe any such effect to vomiting, unless where a calculus, from its peculiar size and form, entirely blocks up the duct, and obliges the bile to accumulate behind it, thus forming a kind of wedge which thrusts it further forward. To us, on the contrary, the impulse given in the act of vomiting would promise to be more effectual if the calculus did not very firmly or entirely close up the duct, but rather permitted the fluid bile, when strongly impelled, to slip along its sides; in which case, if the quantity of bile were too considerable to pass off quickly by the portion of the duct anterior to the calculus, it must necessarily swell it out, and thus prepare a way for the freer egress of the descending concretion.

We are not aware that any examples are recorded of very large calculi having passed through the biliary ducts; yet there is ample proof of the great distensibility of these passages. Dr. Baillie has seen both the ductus hepaticus and the ductus choledochus enlarged to the diameter of half an inch. When such a degree of distension takes place, there is generally a proportional thickening; in truth, an actual growth in every direction. Most commonly, however, if not always, when concretions much exceed the diameter just mentioned, they are expelled from the system by a different process; an adhesion is formed between the gall-bladder and the duodenum, and a sufficient opening effected by ulceration. The calculus thus brought into the duodenum is either then propelled along the intestinal tube and evacuated by the bowels, or a further adhesion takes place between the duodenum and the abdominal parietes; an abscess is formed; ulceration proceeds; and, at length, the irritating substance is protruded through the opening in the integuments.

The cases related by Mr. Brayne, to which we have before adverted, afford beautiful and striking illustrations of the former and more perfect mode of extrusion. The patients, in at least two instances, recovered. Of the *latter* mode of expulsion, to wit, that by an external opening, many examples are recorded, from which we may adduce one as related by the venerable Heberden. The patient, after having suffered for years from a discharging tumour near the umbilicus, was seized with acute pain, nausea, and vomiting, "et post paucos dies exiit calculus fellis tres pollices longus, totidemque ambitu, quique pendebat grana ccxlv." (Commentarii de Morborum Historiâ, &c. p. 213.)

Jaundice may be presumed to arise from biliary calculi, or other similarly acting obstructions, when its accession is sudden and accompanied by acute pain either in the epigastrium, or shooting towards that part from the back or right hypochondrium; especially if there be also vomiting and occasional shiverings, or profuse perspirations,

without any manifest fever or an increased force or frequency in the pulse. Not uncommonly, the pain precedes the appearance of jaundice, returning, perhaps, with great severity for several successive days, and remaining for several hours at each return. Unlike the rigors which forebode an attack of inflammation, the shiverings in jaundice rarely precede the pain, but occur irregularly during a paroxysm, and seem to mark a further propulsion of the calculus along the irritated canal, or its final extrusion through the distended opening of the common duct into the duodenum. The character of the pain is very important: it is acute, and occurs in paroxysms. Sometimes it is intense and excruciating in the highest degree, far exceeding what is felt in the most acute inflammation. The perspiration which sometimes drops from the patient may be ascribed chiefly to the severity of his suffering. The position of the patient also deserves attention. He bends the body forward upon his knees, when not writhing in other directions, and seems to find some relief from pressing upon the seat of pain. Not unfrequently the pain subsides on the appearance of jaundice. The state of the pulse will materially assist in the diagnosis. During the state of simple irritation it is seldom much accelerated or preternaturally firm. When, indeed, it becomes materially harder and quicker, the utmost vigilance should be exercised lest irritation should proceed to inflammation; in which case, the pain usually becomes more constant, the tongue whiter, and vomiting more incessant. These symptoms sometimes rise to such a degree as to resemble those of the ileus, to which, indeed, they then become nearly allied.

It may be proper here to intimate that the entire subsidence of the pain, vomiting, and other characteristic symptoms, does not necessarily imply the passage of the calculus into the duodenum. Very frequently it slips back again into the gall-bladder, there to remain for a time, with little comparative inconvenience to the patient. We need scarcely add, therefore, that the evacuations from the bowels should be carefully examined, inasmuch as the discovery of a calculus cannot fail to afford relief and comfort to the mind of the patient.

The *treatment* of calculous jaundice should be specially directed to three points:—

1. To facilitate the progress of the inhering concretion.

2. To mitigate the pain and other symptoms of irritation.

3. To guard against the inflammation which is to be apprehended from the irritation of the calculus.

In endeavouring to fulfil these indications, opium may be regarded as our sheet-anchor. The first dose, consisting of one or two grains, or an equivalent proportion of the sulphate or acetate of morphia, may be advantageously combined with five or six grains of calomel. If the pain and sickness do not abate, a grain of opium may be repeated at the end of the first hour, and reiterated, after similar or shorter intervals, until ease be procured. After a few doses have been given, a solution of some neutral salt, particularly the sulphate of magnesia, either with or without the carbonate, or the carbonate of magnesia with lemon-juice in an effervescing form, may be administered, in combination with some aromatic water, and repeated at fitting intervals, until a free evacuation from the bowels is obtained. Soda-water, well charged with carbonic acid gas, or simple saline draughts in a state of effervescence, are sometimes useful in allaying the urgent vomiting. If opium by the mouth should not procure ease, a drachm of the tincture may be mingled with a few ounces of thin starch or barley-water, and administered as an enema: prior to which, however, it is sometimes advisable to throw up a large quantity of warm water, which alone sometimes proves very soothing to the patient. As soon as possible, recourse should be had to a warm bath, in which the patient may remain until a degree of faintness supervene,—a state of relaxation peculiarly favourable to the passage of the calculus. Should these various methods be unavailing, and the patient be in a state to bear depletion, it will be expedient to withdraw from ten to sixteen ounces of blood from the arm, in a full stream, and, if practicable, while in the bath and in a half-erect posture. Topical bleeding may be also needful if the continued irritation of the calculus indicate inflammatory action, which may be apprehended from the pain becoming more constant, and accompanied with tenderness on pressure.

Emetics have been strongly recommended in calculous jaundice, and are doubtless powerful agents, though not always safe ones. When we consider the structure and the tortuous course of the common bile ducts, as well as the sharp and angular forms of the calculi, we shall not regard, without considerable apprehension, the action of a powerful emetic. In many instances inflammation, adhesion, and actual obliteration of the ducts, have resulted from the spontaneous passage of a calculus. Is it not, then, highly hazardous forcibly to impel these irritating substances against the already irritated mucous lining of the tubes?

Nauseating doses of ipecacuanha may, however, prove safer and more availing, if the patient be not already in a state of nausea. Such an exception is, however, very uncommon. The advantage to be expected from nauseating doses is of a twofold character. We may hope to promote more general relaxation, as well as to augment the biliary secretion; and thus, while relaxing the affected duct, and carrying down an increased flow of bile, nature may be assisted not a little in her efforts to expel the irritating substance.

We have already stated that the bowels are sometimes in a relaxed state. In other cases, however, they are obstinately constipated, and require strong and repeated doses of active purgatives, such as calomel, with the compound extract of colocynth, and an additional quantity of aloes. Even after the expulsion or retreat of the calculus, it will be desirable to exhibit occasionally a mercurial purgative, at the same time supporting the tone and regular action of the chylopoietic organs by small doses of a neutral salt in some mild bitter infusion.

We have mentioned hydatids, worms, and other extraneous matters, as occasionally producing jaundice. In some instances substances may be passed by stool which will enable the physician, in subsequent attacks, to form a reasonable conjecture respecting the nature of the obstruction. But,

generally, no such intimation can be obtained. The treatment, however, of jaundice from such causes must be very similar to that recommended for the removal of calculi.

II. **Jaundice arising from Diseased States of the Liver, Gall-bladder, or Biliary Ducts,** will of course be attended by the symptoms peculiar to each affection, in addition to those which characterize an obstructed state of the biliary passages. General or partial hypertrophy of the liver (a state not uncommon in great eaters); a tubercular or schirrhous condition of that organ; with many other forms of disorganization, may so interrupt the egress of the bile as to occasion jaundice. When the disease is dependent on such causes, there is sometimes no pain, or pain of a less acute, though more continued, character. The approach of the supervening jaundice is also generally gradual; and symptoms of hectic fever too often succeed. It is a remarkable circumstance that, notwithstanding the prevalence of liver complaints, calculi are rarely found in the interior of that organ. Morgagni affirms, "vix uno in jecinore mihi olim accidit ut invenirem; Valsalvæ autem in nullo, quod sciam." (Ep. xxxvii. Art. xi.)

Diseased conditions of the ducts themselves form, we believe, more common cases of jaundice than is generally supposed. Of these, inflammation and its consequences are among the principal. The mucous tissue of the ducts may become ulcerated, or so adherent as actually to obliterate the canal. It may, also, be so studded with tubercles as to be no longer permeable to the bile. Jaundice from such causes is often incurable and fatal.

III. Our third general division of jaundice comprises those **morbid states of the Duodenum, which have been found to occasion the disease.** Of such we may specify the following: 1. viscid mucus adhering to the inner membrane of the bowel, and sealing up the opening of the ductus communis choledochus. 2. a highly turgid or inflamed state of its mucous membrane. 3. a thickened, tuberculated, or otherwise disorganized condition of the duodenum.

1. Viscid mucus, we are persuaded, is a frequent cause of temporary jaundice. Many of the cases which have been gratuitously attributed to spasm, were probably of this nature.* If we attentively observe the peculiar structure of the termination of the common duct in the duodenum, we shall more accurately conceive how readily its small orifice, in the midst of a papillary projection, may be closed up by a thick and tenacious layer of mucus. Such a cause may be reasonably inferred when the disease has come on rather suddenly, has been unattended by acute pain or other inflammatory indication, yet has been preceded by dyspepsia and a torpid state of bowels. A mucous film upon the tongue, and the absence of the usual marks of chronic visceral disease, will give additional probability to the opinion. A large dose of calomel, followed by a draught containing magnesia and rhubarb in infusion of senna or some other vehicle, will sometimes quickly remove the disease. Much circumspection as to diet, the regular use of active exercise, with an occasional recourse to purgatives, may equally ensure a freedom from relapse.

2. A turgid or inflamed condition of the mucous membrane of the duodenum probably seldom exists without the lower portion of the common bile-duct being similarly affected. This form of disease is characterized by uneasiness or pain in the course of the bowel, which sometimes becomes tender on pressure, the uneasiness being more particularly felt at the expiration of three or four hours after eating, and being often accompanied with vomiting. The tongue has usually a white or yellow surface, and there is considerable thirst. The pulse is also somewhat accelerated. In distinguishing this affection from a diseased state of the pylorus, attention should be paid to the period after eating at which the vomiting occurs. Where the pylorus is alone affected, vomiting generally commences within two or three hours of the meal, and affords almost immediate relief. In the chronic inflammation of the duodenum, of which we are treating, the vomiting seldom occurs until four or five hours have elapsed, and does *not* alleviate the distressing sensations of the patient. He gains, however, sensible relief by taking a tea-cup full of warm fluid, which seems to excite an increased peristaltic action, and thus to liberate the oppressed duodenum from the undigested mass.

It is of extreme importance to overcome this kind of jaundice as soon as possible, lest disorganization of the duodenum, obliteration of the orifice of the bile-duct, or adhesion of its sides should ensue.

Whether simple turgescence or actual inflammation be the cause, the treatment should be essentially the same, varying only in degree. A moderate bleeding from the arm, if the strength of the patient admit of it; repeated local depletion; the warm bath; counter-irritants, particularly in the form of the antimonial ointment; with mild doses of saline aperients, and the most scrupulous attention to diet,—constitute the treatment which experience, no less than general principles, points out as best adapted for the purpose.

IV. **Jaundice produced by the pressure of enlarged contiguous viscera** is of frequent occurrence, although less susceptible of relief from medicine. Cases of simple distension of the transverse colon, from a collection of impacted fæces, are, of course, to be generally removed by appropriate remedies. Compression, too, by the gravid uterus, obviously admits of a natural cure. But a scirrhous enlargement of the pylorus, or of the round head of the pancreas,—two of the most frequent causes of this species of jaundice,—are among the most intractable as well as the most distressing disorganizations which human nature can sustain. In these cases, the most deplorable depression of mind, and an extreme degree of emaciation, are often observable. We have already alluded to some points of diagnosis in reference to the enlargement of the pylorus. As the disease advances, the tumefaction will be distinguishable by the hand: so may also, generally, though with more difficulty, the enlargement of the pancreas.

Affections of the head, irrespective of any previous disease in the biliary organs, have been sup-

* No special reference is made in this article to "spasmodic jaundice," because we have no evidence of its existence.

posed to occasion jaundice. Where, however, a serious injury has been inflicted on the head, such, for example, as is sometimes occasioned by a jump or a fall, it is highly probable that the liver or its appendages received some simultaneous injury, although the effect was not so quickly perceived. This is also the opinion of the judicious Abercrombie. We have, however, long felt assured that the state of the brain and nervous system has been too little considered in the pathology of jaundice. When we regard the influence of the brain and nerves in secretion generally, as well as their influence upon the moving powers, we may reasonably suppose that any considerable deviation from their sound and vigorous condition will be likely to lessen or deteriorate the biliary fluid; and also, by withholding a due supply of nervous energy from the moving forces, retard its transmission through the biliary passages into the duodenum. The remarkable influence which powerful emotions have upon the secretion of bile, and probably, also, on its propelling powers, should lead us more attentively to mark this connection, and the morbid changes thence resulting; by which attention, we may hope, at some future period, to clear up many obscure points relating to the biliary secretion, both in its healthy and diseased states, and ultimately arrive at more successful methods, not only of removing jaundice, but also, in many instances, of preventing its occurrence.

T. H. Burder.

[**Jaundice of the Infant, Icterus Infantum, Yellow Gown or Gum,** is a common affection of children everywhere. It comes on soon after birth, without any obvious cause, continues for some days, and disappears: the only other symptom generally observed being, perhaps, unusual drowsiness. It has been presumed to depend upon some irritation of the intestinal canal, resulting from the digestive system being called into active exertion for the first time, and receiving a new stimulus from the maternal milk. It is more probably owing to the ductus communis choledochus being obstructed by inspissated mucus, or by the meconium, which has collected in the intestines during utero-gestation. By some, it has been referred to too viscid a state of the bile; and by others to a congested condition of the liver. It is, however, an affection of no consequence. Even in torrid climates, recovery is so general, that opportunities have not occurred for discovering the precise pathological condition by dissection. It rarely exists at birth, but is commonly observed from the third to the seventh day—seldom in the second or third week; and terminates in death in the course of a week or two.

The disease would generally yield, probably, without any treatment; but inasmuch as the cause would seem to be, in many instances at least, obstruction of the choledoch duct, it may be well to facilitate its removal by gentle laxatives, as the syrupus rhei, magnesia, or castor oil. The writer has never found it necessary to adopt any other plan of treatment in the cases that have presented themselves to his notice; but should there be signs of hepatic inflammation, a few leeches, followed by an emollient cataplasm, and the warm bath, may be employed. In the more chronic form, remedies have been prescribed by some, the precise object of which is not very intelligible; and hence their action has been uncertain, if not null. (Condie, *A Practical Treatise on the Diseases of Children*, p. 520, Philad: 1844.)

Robley Dunglison.]

KIDNEYS, DISEASES OF. Notwithstanding the activity with which the kidneys perform their functions, the constancy of their action, and the extraordinary rapidity with which their secretion becomes affected, not only when other parts of the system are suffering under actual disease, but even when they are simply and slightly disordered, these organs are not peculiarly liable to alteration of structure. On the contrary, as it has been well observed by a distinguished pathologist of the present day, "in the greater number of diseases, whether chronic or acute, we cannot discover by dissection any change in the structure of the kidneys."

Of the diseases incidental to the kidneys, the most important, perhaps, are **ischuria renalis, nephralgia,** and **nephritis.** To these might be added **diabetes,** were pathologists agreed as to its primary seat; but though several eminent writers have considered it to originate in the kidneys, there are others of equal name and authority who have referred it to a different source. Ischuria renalis has been discussed in a former article; and it is proposed, likewise, to treat, under their respective titles, both nephralgia and nephritis.

In the present article, it will be our object briefly to notice those other renal affections which, on account of the rareness of their occurrence, or the obscurity and uncertainty of their symptoms, or their hitherto uncontrollable nature, may probably be deemed of minor importance so far as practice is concerned; yet which, by those who are truly devoted to medicine as a science, can never be deemed insignificant or uninteresting. The renal affections which we are about to consider may conveniently be arranged, after the plan adopted by M. Andral, under three heads: the first comprising morbid conditions of the circulation of the kidneys; the second, lesions of nutrition; the third, morbid formations.

1. **Lesions of Circulation.**—The kidneys are sometimes found gorged with blood—in that state to which the term **hyperæmia** has been appropriated without any other alteration. One or both organs may be thus congested, and the congestion may affect both the cortical and tubular parts, or only one of them. When they are in a high state of hyperæmia, they assume a dark chocolate hue.

The kidneys are also found in a state precisely opposite to that just mentioned, namely, in a state of paleness or **anæmia,** either partial or general, either complete or incomplete; sometimes existing in a few scattered points only. This is the condition of the kidneys which is frequently observed in persons who have sunk under chronic diseases, especially in dropsical patients, and those who have been the subjects of the affection named by Dr. Good **marasmus anæmia.** When this paleness exists in an exquisite degree, it may be regarded as in itself a disease, but hitherto it has

not been discovered to occasion any functional derangement during life.

The yellow colour, either general or partial, which is occasionally observed in the kidneys, is probably owing, as M. Andral has remarked, to a less advanced stage of anæmia.

It may suffice thus briefly to have noticed that congestion of the kidneys, or extreme paleness of them, may occur without their presenting any other morbid appearance. Such instances, however, are rare; hyperæmia, as well as anæmia, is usually found in connection with other degenerations of those organs: the former, for example, conjoined with softening, or with induration together with hypertrophy; the latter with softening, or occasionally with induration and atrophy.

2. **Lesions of Nutrition.**—The kidneys are sometimes much larger than natural, though otherwise unaltered. Both kidneys may be thus affected, but more commonly the **hypertrophy** is confined to one only. As was observed while treating of ischuria renalis, great augmentation of volume of one kidney is not unfrequently met with when the other is, by disease or obstruction, rendered incapable of performing its office. The enlarged gland takes upon itself the duty of its fellow. Hypertrophy of the kidney seems occasionally to depend upon its being doubly nourished, by receiving its supply of blood from two renal arteries. This state of kidneys, generally combined with increased vascularity, is the most usual morbid appearance observed in cases of diabetes. An extreme paleness of their tissue, with softening, has indeed been often mentioned as the principal alteration which takes place in them in that disease; but in various cases upon record, and in every instance which has occurred in our own experience, the kidneys have been more vascular, and generally larger than natural.

To this variety of morbid alteration—hypertrophy—may, perhaps, be referred those cases where the kidneys are united by an intermediate substance; a sort of middle lobe, resembling them in its texture, and passing over the vertebral column from the one to the other.

With respect to the nature of those hard, whitish, globular bodies, of various sizes, which are mentioned by authors as existing in the cortical substance of the kidneys, and which in some few instances have been detected in the tubular substance also, little is known. Some have regarded them as serving to secrete the urine, while others have supposed them to consist of a mass of vessels interlaced: but it is clear that granulations like these sometimes constitute a really morbid state. They nearly resemble the yellow granulations of the liver, which Laennec thought an accidental tissue, and to which he gave the name of *cirrhosis;* but which, in all probability, are the result of an unusual development of one of its elementary tissues, namely, of its white substance. These granulations in the kidneys are sometimes thinly scattered, sometimes so very numerous as to leave hardly any trace of their cortical portion, and even to occupy the intervals between the cones of the tubular portion of them. Such a state of the kidneys may, it would seem, produce dropsy; for in various cases of dropsical patients no other morbid appearance of importance has been detected. Although, as M. Andral observes, it is difficult to comprehend how dropsy is produced by this affection, the fact is nevertheless certain.

[Under the head of Dropsy, (vol. i. p. 707,) attention has been drawn to the *Granular Disease of the Kidney, Morbus Brightii*, which is attended with the secretion of albuminous urine — hence termed *Albuminuria*. Yet the appearance of albumen in the urine is by no means diagnostic of this condition of the kidneys, as has been shown by the observations of the writer, and of others, (*Practice of Medicine*, 2d edit. ii. 29, Philad. 1844); and cases have been published recently, in which, on the one hand, Bright's disease existed without albuminous urine; and on the other hand, albuminous urine was present without Bright's disease. We cannot, indeed, with certainty, infer the existence of any particular organic disease of the kidney from the existence of albuminous urine.

By those who look upon all morbid derangements to be the result of inflammation, granular disease of the kidney has been thus regarded, and hence the term *nephritis albuminosa*, which has been given to it. Like other morbid degenerations, however, it is owing to a *vice* of the system of nutrition, which is inexplicable. (Christison on *Granular Degeneration of the Kidneys*, Edinb. and Philad. 1839; or an abstract of the same in Tweedie's *Library of Medicine*, 2d Amer. edit. iii. 271, Philad. 1842; also, Rayer's *Traité des Maladies des Reins*, 2e livr. Paris, 1837; Martin Solon, *De l'Albuminurie*, &c., Paris, 1838, and A. Dalmas, *Dict. de Méd.* xxvii. 364, Paris, 1843.)]

The kidneys, again, are subject to general or partial *atrophy*. In the former case, one or both of them may be diminished in size, without being altered in structure, and without any symptoms of disorder of the urinary apparatus having been present during life. Such a condition of kidney may have been coeval with the patient's birth; or the atrophy may have been the result of mechanical compression; of a tumour in the vicinity of the gland; or of a collection of pus formed around it. One kidney may be wholly wanting; and this defect may be either congenital, or the consequence of disease. Of the former occurrence, a remarkable example has been given by Morgagni, Letter 31, Art. 25. In the patient there referred to, there was no trace of the left kidney, but the deficiency was supplied by the right, which was double the natural size, and furnished with a double pelvis and ureter; and both ureters went to the right side of the bladder. When one kidney has been destroyed by disease, no inconvenience may arise, provided the remaining one be sound; but if that be also degenerated, it is obvious that the patient will experience much and severe suffering. An instance is given by M. Andral, where dropsy, of which the organic cause could not be discovered during life, was ascertained to have arisen from great disease of the urinary apparatus; the left kidney was totally gone; the right was enlarged, softened, and studded with those whitish granulations which have been already noticed.

Several curious varieties in the form and the situation of the kidneys are occasionally met

with; but they can scarcely be considered as diseases, or, if they be so considered, they are not to be recognised by any peculiar symptoms, nor can they ever be influenced by medical treatment.

The morbid states we are next to mention, are *softening* and *induration*. The former state is not unfrequently conjoined with turgescence or hyperæmia, and this combination may be regarded as affording strong evidence of inflammation. In patients who, during life, have suffered under symptoms of nephritis, a very soft state of the kidneys, with intense redness, has been observed. The same condition has also been found accompanying certain chronic affections of the bladder, as thickening of its inner membrane.

There is a peculiar softening of the kidneys, which has been described by Dr. Baillie, and by Mr. Wilson, in his lectures. The kidneys are converted into a soft loose mass, resembling in appearance common sponge. When shaken in water, the parts all separate from each other, somewhat like the unravelling of the shaggy vessels of the placenta. In one such case, small shreds, apparently portions of blood-vessels, had been passed by the urethra; and upon examination after death, Mr. Wilson conceived that they might have come from the kidneys during life. This is one of those lamentable states of disease over which, even if known to exist, our art can exercise no power.

There is another kind of softening, in which the substance of the kidneys is extremely pale, or of a grey tint. This alteration has been found where no symptoms of the disease of the urinary organs had manifested themselves.

Induration of the kidneys may be attended by congestion or by paleness of their tissue. In the former variety, the organs are generally enlarged; in the latter, they are also occasionally enlarged, but most commonly diminished in size. In the pale induration, the kidneys, though firmer than ordinary, may yet retain their natural structure; or they may be almost as hard and as white as cartilage, their natural structure being entirely lost. This is the state which has been called scirrhus of the kidney. It is very rarely met with, and the symptoms attending it are not to be distinguished from those which belong to other renal affections. When both kidneys are thus diseased, very little urine will be secreted, or there may be complete ischuria renalis. The remedies we must employ, must of course be those which have been useful in nephralgia and in suppression of urine. Opium and hyoscyamus are more likely to afford relief than any other medicines.

3. **Morbid Formations.** — Of the diseases belonging to this division of our subject, the most important is that very formidable and intractable malady first accurately described by Mr. J. Burns, under the title of spongoid inflammation; but more generally known by the appellation of *fungus hæmatodes*, assigned to it by Mr. Hey. Until of late years, it was commonly confounded with cancer, of which, indeed, it is still reputed a species by some writers of high reputation. In this light it is regarded by M. Roux. Mr. Wardrop has named it soft cancer; and Mr. Langstaff has remarked that sometimes the scirrhous, medullary, and fungoid structures, are so blended in various parts of the same subject, that they appear like different stages of morbid growth, and the difficulty the pathologist experiences is in deciding whether the disease is of the cancerous or hæmodotal kind, or *whether they are not of the same class*. The same author refers to Sir Everard Home, as stating that the fungoid and the cancerous sore are the effects of one disease, only varying according to the structure of the parts which it attacks. As, however, it is now ascertained that the same structure, the female breast for example, is liable to either disease, and that fungus hæmatodes has been observed in almost every part of the body, the position of the last-mentioned pathologist is no longer tenable. It may be admitted that, in the malignancy of their character, as well as in some other points, fungus hæmatodes and cancer bear a strong resemblance to each other; but at the same time we must maintain that the former disease wants the pathognomonic signs by which cancers are distinguished. (See Fungus Hæmatodes.)

Mr. Wardrop first noticed fungus hæmatodes as affecting the kidney; but he acknowledges that, in the case he relates, the morbid alterations of structure would not have been alone sufficient to warrant him in calling it fungus hæmatodes. He conjectured it to be such, because there was fungus hæmatodes over the hip-joint. Since the publication of his work, however, several well-marked cases have been given in detail by M. Langstaff. In one of these, the subject of which was a man aged seventy, affected by hemiplegia for several years, the symptoms were, for a length of time, difficulty of voiding the urine, which was usually tinged with blood, and afterwards retention; great pain in the region of the left kidney, and uneasiness of the rectum. He died apoplectic.

In another very interesting case, that of a young lady, the symptoms were frequent desire to relieve the bladder, and in the course of a few hours an immense quantity of limpid urine was discharged, without alleviation of the urgent propensity to void more; then, the irritability of the bladder increasing, arterial-looking blood was discharged in considerable quantity. Some doubt existed at first as to the source of this hemorrhage; there was some reason for suspecting it might proceed from the uterus, but the introduction of the catheter at once settled the question. After several recurrences of hemorrhage, accompanied by great irritability of stomach and bilious vomitings, the discharge of blood ceased for a time, but then the urine was very turbid, and deposited a mucopurulent sediment. About six weeks subsequent to the first attack, dull pain was complained of in the right side, and upon examination a tumour was distinctly felt in the right hypochondrium, and traced into the iliac region: there was pain upon pressure, and pulsation of the part. The discharge of blood afterwards returned at intervals, and the tumour increased greatly, in despite of all the means that could be devised for checking its growth. The patient's general health of course suffered dreadfully, and sometimes she appeared to be reduced to the last degree; yet, in the intervals of the attacks of pain, sickness, and hemorrhage, she rallied in a surprising manner; nor was it until five years and a half from the com-

mencement of her sufferings that she sank under them. Upon examination after death, it was found that the right kidney occupied the principal part of the abdominal cavity: the diseased mass, with a portion of the liver, which adhered to it, weighed eleven pounds and thirteen ounces. It was almost entirely formed into protuberances of different sizes, and the peritoneal surface was greatly condensed. When that part of the tumour which constituted its chief bulk was cut into, it was found to contain a coagulum of blood, not adhering to the sac, and weighing three pounds, and composed of concentric layers, as in an aneurism which has formed rapidly.

The left kidney, which weighed twelve ounces, was much altered in structure, being chiefly occupied by pulpy tubera, which were rendered red by minute injection.

In the Medical Gazette for May, 1831, is related a case of fungus hæmatodes of the kidney, in a subject only four years of age. In this instance, the symptoms of renal affection were so trifling, that no suspicion existed in the mind of the medical attendant that such affection was the sole, or even the chief cause of the little patient's distress. It had been conjectured, as in Mr. Langstaff's case just mentioned, that the liver was enlarged; but the apparent hypertrophy of that viscus was occasioned by the enlarged kidney, which pushed it upwards and outwards towards the diaphragm. These unhappy cases have hitherto resisted every mode of treatment. When fungus hæmatodes attacks external parts, it is still one of the opprobria medicinæ; what, therefore, can be expected from our art, when its ravages are obscurely going on in internal organs?

The formation of *hydatids* has been stated as being no uncommon disease of the kidney. It would, however, seem that the true hydatid is not often met with in that situation; while those cysts with thin and nearly transparent parietes, and which contain a limpid colourless fluid, very like water, but having some coagulable matter, are of frequent occurrence. These may be dispersed over the surface of the kidney, or be imbedded in any part of its substance. They often attain an enormous size, so as to occupy by much the larger portion of the gland; and they vary in number, from a single one to many hundreds. Each is a distinct bag, and does not contain others within it. It is probable that these cysts depend upon a morbid alteration of the structure of the kidney.

In the true hydatid the cyst is thicker and much firmer: and, when cut into, appears laminated. Within the bag there is sometimes only one hydatid, but generally there are a considerable number; some attached to its parietes, others loose and floating in the fluid. These hydatids sometimes have numerous others adhering to their inner surface, or floating freely in their cavity. (See Hydatids.)

We possess no other distinct evidence of the presence of hydatids than that which their being passed by the urethra with the urine affords. All the other symptoms, such as pain of back, symptomatic fever, nausea and vomiting, belong equally to other renal diseases. Every modification of treatment has been tried, when their existence has been positively known, or has been suspected, but in vain. An artificial outlet cannot be made for them. When they obstruct the flow of urine, as sometimes happens, the bougie or catheter must be employed. Under the steady exhibition of turpentine the pain of the loins has been known to cease, as well as the passing of hydatids; but in many instances the same remedy has totally failed. The muriated tincture of iron has been given, but with no permanent good effect.

Of the remaining morbid formations in the kidneys, *tubercle* is the only one which merits the least attention. It is very rarely found in them, and, when it is, generally exists in other organs also. The tubercle of the kidney is said by Dr. Baillie to resemble exactly the common tubercle of the lungs.

Fatty matter and *gelatiniform matter* are now and then observed in the kidneys, and they have been found converted into a bony or earthy substance. But these morbid appearances are of extreme rarity.

We have thus endeavoured to furnish a sketch of those diseases of the kidneys which, though hitherto little understood, could not, in a work like the present, be passed over with propriety. In the actual state of our knowledge, our descriptions must necessarily be imperfect. The period may be distant in which their nature and symptoms will be thoroughly comprehended. The most patient attention to the phenomena of certain diseases, the most diligent search into the morbid changes produced in the structure of parts by morbid actions, may for a long time seem to be unproductive of any important practical results; still, patient investigation should never be abandoned. It may be the good fortune of others hereafter to elucidate what is obscure in the affections of which we have just given a brief account; it was our duty to record what is already known respecting them.

H. W. Carter.

LACTATION.—Lactation in the human female, when naturally conducted, cannot be called a disease; but even under the most favourable aspect there are often circumstances which require attention and regulation, both for the purpose of alleviating pain and of preventing mischief. There are, moreover, so frequently interruptions to this usually healthy process, and there are so many important questions connected with the flow of milk at various periods, that it becomes necessary, in a work on practical medicine, to discuss them, although somewhat briefly.

The close sympathy between the uterus and the mammæ is evident even in the unimpregnated condition. At puberty the breasts enlarge and their glandular structure is developed; a day or two before menstruation, and during the period itself, the breasts become tumid and more or less painful. There is an affection which may be termed *spurious pregnancy*, described by Dr. Gooch, where, apparently from uterine irritation, the breasts are swollen and affected with shooting pains, and even a serous fluid resembling thin milk oozes from the nipple, being precisely what takes place in real pregnancy, wanting only the darkened areola. In some diseases of the uterus, particularly in hypertrophy of that organ, a similar state of the breasts is often observed. In real pregnancy the altera-

tion in the breasts is strongly marked, and the quantity of milky serum which is secreted is sometimes very copious, especially towards the close of utero-gestation. Sauvages mentions an instance where as much as a pint and a half was daily poured out as early as the fifth month. Many women, however, show no appearance of milk at all before delivery, who yet have abundance afterwards. After parturition it is usual to place the child to the breast within the first twenty-four hours, partly to draw out and form the nipple before any hardness of the breast occurs to render that difficult, and partly to encourage the flow of milk,—for at a later period the contact of the child's mouth will immediately excite it. With first children there is rarely any quantity secreted before the third day; about that period, but often a day or two later, the breasts become hard and swollen, hot and painful; the pulse is quickened, the skin above the natural temperature, the thirst urgent, the sleep broken and troubled with unpleasant dreams, and the sensorium disturbed, so that the patient, whilst yet awake, will fancy strange objects about the bed. The process goes on, more or less rapidly, till the milk is at the height, as it is termed, when the breasts are extremely hard, and the gland is felt knotted and loaded, and is at the same time very tender; the swelling may extend quite to the clavicles and under the arms, the axillary glands being similarly affected; a small quantity of milk will often ooze out from the nipples, particularly if the breasts be fomented, or gently pressed with the hand. If the child be put to the breast, the action of suckling is attended with great pain to the mother, but followed by much relief. As the milk flows, the hardness diminishes, and the swelling subsides. After a few hours, if the milk be freely and frequently drawn off, the sensations become more comfortable, the pain is removed, the breasts are only distended when the child has been long away, the pulse and skin are restored to their natural state, and the process of lactation is then fairly established.

In the management, up to this period, much may be done for the relief of the patient. As soon as the symptoms begin, a purgative may be administered with great advantage, and one which contains the neutral salts in combination, as it will promote watery discharges from the bowels, is preferable: this should be repeated in twenty-four hours, or earlier, if the case is severe. There is distressing thirst, but if we allow a too free indulgence in liquids, the distension of the breasts is increased; it is therefore better to allow only a small quantity of drink at a time, and perhaps nothing is so effectual in a small bulk as an effervescing saline draught frequently repeated. As a new-born infant will often experience much difficulty in drawing out the nipple of a hard and swollen breast, or in extracting the thick milk itself, it is often advisable to have this done by an older child or a grown person, or by artificial means. These consist of various sorts of breast-pumps, where a smooth-edged glass tube is placed over the nipple, and a vacuum being produced by suction or by syringes, or by heat, the milk is thus drawn off, and the buried nipple made to project. Great benefit may be obtained by fomenting the hardened breasts with hot water, or by applying mild poultices, which promote the easy flow of the milk and relieve the distension. This is also often effected by small wooden bowls soaked in boiling water, and wrapped up in flannel, which are then placed over each breast. As a more permanent application, hare-skins are often used; cabbage-leaves were also formerly much in vogue to promote a copious perspiration over the surface; the smell, however, is very unpleasant, and the same advantage may be gained by oiled silk.

The milk first drawn has a purgative quality, and thus serves to carry off the meconium which is loading the large intestines. On this account, when a child does not get the first draught of the breast, from being nursed by a wet-nurse, or from being brought up by hand, a gentle purgative should always be given; diarrhœa of an irritable character, and even convulsions, often being produced from retained meconium. In this country it is usual to give a purgative under all circumstances, but it is not customary in many parts of the continent, and it is doubtful whether it be not often superfluous. By the experiments of Dr. Robert Lee, it would appear that the meconium is an excrement, and does not contribute to nourishment; but that above the situation of the meconium a quantity of highly nutritious albumen is found in the intestines, serving for the sustenance of the infant till lactation is established. A purgative given before that period will therefore carry off this substance, and artificial nourishment must be given to make up for the loss of the natural provision.

The milk varies considerably in condition during lactation. At first it is thick, yellowish, and having a very large proportion of cream; several days elapse before it possesses its natural appearance, which should be thin, bluish, and sweet. The quantity of cream varies very much according to the diet, and the frequency with which the breasts are drawn. Some milk has a decidedly saline taste; and at other times it has been distinctly bitter, so that the child will turn away from the breast in disgust. Its taste and qualities may be easily affected by articles of diet, by passions of the mind, repletion, hot rooms, &c. and the child is more or less disordered by the alteration. Medicines will often affect the milk in a very striking manner; a purgative given to the nurse will frequently act violently upon the child, without in the least affecting the individual herself; in the same way, alkalies given to the nurse will relieve acidity in the child's stomach; and mercury given through a similar medium will cure syphilitic symptoms in the infant at the breast.*

Milk has been said to be sometimes black or green, but there is in such cases most probably a mixture of blood, from the exterior or interior of the nipple. The writer has seen four instances where it was of a golden yellow colour, and where, upon standing, a thick layer of bitter cream, as

* On the authority of Mr. Keate, it may be here stated that a foreign gentleman, a patient of his, was in the habit of regulating his hepatic system, when there was a deficiency of bile in his motions, by taking asses' milk medicated by giving the animal a certain quantity of a mercurial preparation (the nitrate of mercury). The effect was very marked, and he could bear mercury in no other shape.

yellow as puro bile, floated on the surface. In neither of these cases was the patient jaundiced; but a very copious flow of bile being kept up from the intestines by mercurial purgatives, after a few days the yellowness gradually disappeared; the child, till then, having been much griped and affected with diarrhœa. In no cases where wet-nurses have been jaundiced, has the writer seen the milk yellow; and it is no uncommon thing for them to become thus disordered, upon a sudden transition from poverty and a scanty diet to a full and luxurious mode of living. Milk will disorder an infant from merely being too rich, without its being otherwise altered in character. The remedy here will consist in purging the nurse, making her take plenty of active exercise, and putting her upon a more spare diet. The properties of the milk will also be considerably influenced by pregnancy or by menstruation.

There are some popular errors upon this point, which it is not difficult to expose. One is, that women will not become pregnant during lactation. This is far from being the case, and Mr. Roberton of Manchester (vide Edinb. Med. and Surg. Journal, No. 110) has taken the trouble to inquire minutely into the result of 160 cases, in which he found that eighty-one women had become impregnated during suckling. Mr. Roberton has stated "that the appearance of the catamenia during lactation does not appear to have any influence in disposing to conception." In this respect the writer's experience leads him to a different conclusion: he is decidedly of opinion that those women who menstruate during pregnancy will more readily conceive than those who do not; and he has also remarked, as Dr. Hamilton has done, that both these occurrences are more common with first children; hence women under such circumstances are not, *cæteris paribus*, so eligible for wet-nurses. Dr. Mason Good has recommended cohabitation with the husband during lactation, as likely to increase the quantity of milk; arguing upon the fact that the Tartars are accustomed to irritate the vagina of their mares for a similar purpose. The objection to his proposal will only apply to hired wet-nurses, lest they should become pregnant. Wet-nurses have very frequently recommended themselves to the writer on the plea that they have still continued to menstruate, by which they believe that their milk is *renewed*, as they term it, every month, so as to be rendered fit for much younger children than it would otherwise have been. This occurrence, however, much impairs the milk, in its probable duration, and in its properties at the period itself. The infant becomes unusually fretful, brings up the milk by vomiting, and has frequent watery motions of a spinach-green colour. These symptoms are so peculiar, when arising from no very obvious cause, that it may be generally safely guessed that the nurse is either menstruating at that moment, or will do so on that day month; for it is not uncommon to find the effects on the child brought on, although the alteration in the uterine condition of the nurse is not complete.

One of the most early and most troublesome attendants upon suckling is *soreness of the nipples*, as the pain recurs as often as the infant is put to the breast. Very few escape some degree of tenderness, with first children especially, but the inconvenience is soon obviated, and the delicate skin becomes callous, like the fingers of a harp-player —an effect which may be hastened by some slightly astringent or gently stimulating lotion, as green tea, brandy, weak solutions of the sulphate of zinc or of alum. If more severe and intractable, a solution of one to two grains of nitrate of silver in one ounce of rose-water will be found of service. Should the skin become excoriated, or should a crack take place at the junction of the nipple to the areola, a shield of glass, wood, ivory, or silver, should be used, with an artificial or prepared cow's teat, through which the child may suck without biting or much disturbing the nipple. The surface of the sore may then be freely touched once a day or oftener with the lunar caustic, and in the intervals the part may be kept well smeared with ointment containing honey, or a minute quantity of Peruvian balsam. Preparations containing lead or mercury in any form are scarcely advisable, as they may be swallowed by the infant. Where the surface of the nipple is not chapped, but unusually hot and dry, and very tender to the touch, all astringent lotions and stimulating applications aggravate the mischief; the simplest ointments, of wax and oil alone, will be found to agree best, or the part may be covered with powdered gum arabic or a bread-and-water poultice. The dress should, in all cases, be carefully kept from irritating the sore nipple, by means of wax cups, shells, or glasses for the purpose.

There is one species of sore nipple not often noticed by practitioners, (who are too apt to leave these cases to the management of the nurses,) which the writer has found more intractable than any others, and the means frequently of inducing the mother to give up suckling entirely, from the constant torture to which she is exposed. There is little or nothing to be seen but a small spot at the orifice of the nipple, which is elevated and irregular in appearance, extremely painful to the touch, and exuding a sanious ichor. When the child is put to the breast, the pain is most acute, and seems to come from the interior of the nipple and breast; and the first and last milk is generally mixed with blood. It would appear as if the interior or lining membrane of the lactiferous tubes was in a morbid condition. Little or nothing can be done for this affection. The free application of caustic to the external orifice, and poulticing the breast, has now and then effected a cure, along with careful attention to the stomach, bowels, and general health, which is highly essential. Those who have uniformly suffered from sore nipples on former occasions have frequently seemed to prevent them by using, previously to parturition, for several weeks, either an astringent or demulcent lotion, according to the state of the skin.

Inflammation will occasionally attack the breast itself at any time during lactation, but most frequently at a very early period, when there has been exposure to cold, much trouble in the first management of the milk, or soreness of the nipples; it does not so frequently happen where the milk is at once driven back without suckling the child. If not immediately treated by leeches, by fomentations, and poultices, hot and frequently changed, or, as some prefer, by cold lotions, abscess

will take place, accompanied by great pain and much constitutional disturbance. The treatment of this state comes within the immediate province of the surgeon; but there are one or two circumstances respecting *milk abscess* deserving of notice in this place. It is very customary when abscess is threatened, to persevere in keeping the child to the breast, or otherwise drawing the milk off; partly to enable the patient to continue suckling, and partly to prevent the milk collecting in and distending the inflamed breast. If the inflamed portion be not extensive, there is no objection to this, as a small abscess will not much interfere with the functions of the remaining sound parts; but if the whole, or nearly the whole, of the breast be implicated, the pain of suckling will be very violent indeed, and the frequent disturbance and irritation will contribute to increase the inflammation, and diminish or entirely obviate the chances of preventing the formation of matter. Should abscess be formed, and matter be felt fluctuating, the most experienced practitioners agree upon the propriety of puncturing early and freely; otherwise in such a peculiar structure most extensive mischief will take place, and the surface remain disfigured afterwards in the most unsightly manner. It is curious to notice in subsequent confinements how little the real glandular apparatus has been destroyed, even where large collections of pus have formerly been evacuated, so that the patient will sometimes be enabled to nurse with but little trouble; although from some partial obliteration of the ducts, there is always rather more difficulty in the flow of the milk.

Milk Fever.—What is called *milk fever*, is an aggravated and morbid form of the healthy and natural excitement which takes place at the onset of lactation. The febrile symptoms are much more severe; there is a well-marked precursory rigor; there is great pain and throbbing of the head; a flushed countenance; intolerance of light and sound; the pulse is full, hard, and rapid; the thirst excessive; the skin hot and dry, and the tongue covered with a thick fur. These attacks may be usually traced to a too stimulating diet, a heated atmosphere, much exertion and disturbance, or mental agitation. They are much less frequent than formerly, when great fires, loads of blankets, and brandy caudle were the usual appendages to a lying-in chamber. If the flow of milk be encouraged, and gently yet freely drawn off; if the room be kept cool; agitation soothed or avoided; purgatives duly administered, and perhaps diaphoretic medicines; a remission of the symptoms will usually take place in a few hours, accompanied by a copious perspiration and tranquillity of pulse. On the contrary, by bad management phrenitis may supervene, of a very dangerous character; when the milk will be entirely suppressed, and nothing but the free use of the lancet will save the patient.

A very common expression is, that in such cases *the milk flies to the head*. In phlegmasia dolens the milk was also supposed to fly to the leg, and hence the French writers formerly called it, "dépôt du lait." It has several times happened in the writer's experience, that where bleeding has been had recourse to in inflammatory diseases with sudden suppression of milk, the serum of the blood, when separated by rest, has been white, opaque, and bearing nearly all the characters of milk, except the formation of cream on the surface. It may here be observed, also, that where the milk is driven back artificially, and active purgatives are employed, a great quantity of milk-like fluid may be generally seen in the motions. Depressing passions, fear, and anxiety, will suddenly drive off every vestige of milk; but the only genuine *translation* may be said to be those extraordinary instances where the milk has receded more or less rapidly from the breast, and a vicarious discharge has taken place from other parts, the general health remaining but little affected. The most common example of this is where the discharge has taken place from the vagina in the form of leucorrhœa; but it has also occurred from the fauces, the navel, the eyes, the kidneys, the whole surface of the mammæ, &c.

Where the child is to be weaned, or where a mother does not wish to suckle, or is not able from constitutional debility, or local defect, or where the death of the child has taken place, it becomes necessary to "*backen*" the milk, as it is vulgarly termed. This may be done the most safely for the mother by her not being too impatient. If cold evaporating lotions are applied to the breasts, there is a more rapid dispersion of the milk, but there is more risk of fever, phrenitis, &c. It so happens, however, that these cold lotions rarely are allowed to act as such, for nurses in general are so particularly careful to cover up the patient's neck with the bedclothes and wrappers, that the lotions very rapidly become warm fomentations. In the writer's opinion, the best and safest applications consist of stimulating liniments, applied warm and also constantly, by means of layers of lint or flannel. The breasts should also occasionally be gently pressed and rubbed with warm oil; and if they are very hard and distended, a small quantity may be now and then squeezed out or drawn off artificially. The bowels are to be actively kept open by saline purgatives; the diet is to be low, and the quantity of drink lessened. It will be but a few hours before the extreme distress is mitigated, but it will be often several days before the milk is thoroughly dispersed, or the remedies can be discontinued. The sensation of "draught of milk" in the breasts will sometimes be felt two or three times a-day for weeks afterwards. In weaning a child, however, it is often the plan to do it so gradually, by accustoming it to partial feeding for some time previously, that little trouble is at last experienced in dispersing the milk. It is still very desirable that opening medicine should be plentifully given, even under such circumstances; as from this discipline being neglected, patients will often suffer for months afterwards, with great depression of spirits, loss of appetite, feeling of weight and lassitude, and general ill health,—sensations which are soon relieved by having recourse to opening medicine.

An excessive secretion of milk will sometimes be met with; but in nearly all these cases there is apparently some defect in the organization of the nipple, or the lactiferous tubes have lost their elastic property of retention, for in the intervals of suckling a constant and very copious discharge of the milk takes place. The daily waste and drain cannot exist long without materially affecting

the health and strength ; and unless the flow can be kept in check, there is no remedy except weaning the child, and repelling the milk altogether. Various plans have been proposed, but the trial is not often successful. Local strong astringent applications, as lotions of alum, oak-bark, zinc, &c., sometimes do good, but they are apt to effect too much, and drive away the secretion entirely. The astringent tonics internally, particularly the mineral acids, steel, kino, and alum, have occasionally been of service. Belladonna has been advised, both locally and in small doses internally. The breasts should be kept as cool as possible, and cold bathing be daily had recourse to.

The period of lactation is generally one of the most healthy of a woman's life; but there are many exceptions to this; and many who have begun with success, by continuing to suckle too long, by a too limited diet, by much loss of rest, or by other causes, have had their own health and that of their infants considerably and even fatally impaired. A recent writer has attempted to define the exact period to which suckling should be limited, as far as the advantage of the infant is concerned ; but all such definitions are constantly contradicted by experience. There is much fallacy also in the arguments to prove that protracted lactation is the cause of various infantile diseases, especially hydrocephalus. Putting aside altogether the striking fact that the dangerous disturbance of dentition is proceeding at the same time, it may be allowed that hydrocephalus and the other diseases mentioned may and often do occur after or during protracted lactation ; but they happen quite as frequently, and indeed more so, where a child has been brought up by hand, without the breast at all ; or where it has been badly fed, or over-fed, whilst still suckling. In all the cases of mothers who have nursed their children for two years and upwards, in the class of life alluded to by Dr. Morton, it may be, perhaps, fairly assumed, from the known habits of the parents, that the children have been fed at the same time, and generally fed upon exactly the same sort of food as would be more adapted to older children. "The child eats whatever we eat" is the common expression, though the child is still allowed to apply to the breast at pleasure, to prevent the chance of a fresh pregnancy. Many children, particularly in the higher classes, where hired wet-nurses are employed, are kept for a long time at the breast because they are backward with their teeth, have had their bowels disordered by a premature attempt at weaning, or because they are in delicate health ; but if hydrocephalus supervene in such instances, it is quite as likely that the previous disordered health may have been the cause, as the protracted lactation. In savage nations, in many parts of America, the east, and the polar regions, it is the constant custom for mothers to suckle their infants for two years at least, and without any of the pernicious consequences which Dr. Morton has imagined. (See Edinburgh Medical and Surgical Journal, No. 110.)

It is certainly true, that if the mother's health be impaired by undue lactation at either an early or a late period, the child will suffer from defective nutrition, but in no other manner.

[According to M. Desormeaux (Art. Lactation, in *Dict. de Médecine*, xxii. 425, Paris, 1838,) some women are able to continue suckling almost indefinitely, provided the child be put to the breast. It is not uncommon, he says, in France to see nurses suckle three children in succession, comprising a period probably of from 30 to 36 months; and cases are not rare of women who have suckled their children for four years, and four years and a half. He himself saw a nurse from Normandy, who had suckled several children successively on the same milk for upwards of five years; and a lady, worthy of all credit, informed him, that she knew a woman who nursed five children in succession, so that her lactation continued at least seven years.

It has been a common opinion, that when menstruation recurs during lactation, the milk of the nurse is unfit for the perfect nutrition of the child. M. Gendrin would on no account permit a woman to continue nursing after the catamenia had returned. The subject has been recently investigated by M. Raciborski (*Dublin Medical Press*, Aug. 2, 1843, cited in *Amer. Journ. of the Med. Sciences*, Oct. 1843, p. 455,) whose inferences are as follows:—contrary to generally received opinions, the milk of nurses who menstruate during suckling does not differ sensibly in physical, chemical, or microscopical characters from that of nurses whose catamenia are suspended ; — the only difference which can be detected between the kinds of milk is, that, in most cases, the milk of menstruating nurses contains less cream during the menstrual period than in the intervals; hence arises the bluish appearance presented occasionally by such milk; and he concludes that a nurse should never be rejected merely because she menstruates.]

Dr. Marshall Hall has well described the state of disorder of the general health in females, which is induced by exhaustion of the frame, arising from protracted lactation, or from the original powers not having been equal to the continual drain on the system. One of the earliest symptoms of failure is a dragging sensation in the back, when the child is in the act of sucking, and an exhausted feeling of sinking and emptiness at the pit of the stomach afterwards. The appetite fails gradually, but entirely ; there are thirst, a dry tongue, a quick feeble pulse; costive bowels, headach, with giddiness, lightness, and failure of sight. The skin is hot and cold alternately ; there are profuse night-perspiration; generally leucorrhœa, great debility, and emaciation. The memory is impaired; the spirits are weak, irritable, and depressed. [Occasionally, too, aphthous stomatitis occurs, and it would seem to occur more frequently in some localities than in others: (see Aphthæ.)] Symptoms resembling phthisis will sometimes come on, and mania is not an unusual result. Though much may be done in the first instance by the proper use of tonics, cold or sea bathing, change of air, a regulated diet, and local applications, to restrain the leucorrhœa; and though we may now and then effect a portion of good by partially feeding the child, yet the quickest and most effectual remedy is to wean the child. The different symptoms resulting from the exhausting process require appropriate treatment, according to

circumstances; but all treatment will generally fail, unless we remove the cause of exhaustion.

Before leaving the subject of lactation, it may be remarked that males have also the organs for supplying milk, in a dormant state, which under peculiar circumstances have been excited into action, and have supplied milk in abundance, sufficient to suckle children. Instances have been given in recent times by Humboldt and Captain Franklin, and many others are on record. Very old women* and virgins have also had milk in considerable quantities, the nipples in all these cases having been frequently stimulated by the contact of the child's mouth purposely applied.

[Several instances not only of very old women and virgins but of men having suckled children have been given by the writer in his *Human Physiology*, 5th edit. ii. 436, Philad. 1844.]

It is by no means uncommon to meet with newly-born infants, of either sex, who have their breasts turgid with a milk-like fluid, which is dispersed with difficulty.

C. Locock.

LARYNGITIS. — Of inflammations of the larynx there are many varieties, to which we mean briefly to allude before we enter upon a description of that formidable disease which has of late years obtained the title of laryngitis, and is the proper subject of this article.

Beginning with the slighter inflammations, we may, 1st, advert to that affection of the membrane lining the larynx, which is distinguished by hoarseness, or complete loss of voice, and by slight cough, an affection which, arising from exposure of the body, or part of it, to a current of cold or damp air; from partial or general wetting; or from an incautious laying aside of some article of dress, especially during changes of the weather, is so slight, as seldom formally to be brought under the observation of the physician.

2dly. Similar symptoms not unfrequently occur in connection with common sore throat (*cynanche tonsillaris*), and for the most part they also form a case for domestic prescription, unless the inflammation is so considerable as to threaten suppuration.

These two affections are chiefly prevalent about the beginning of winter and in the spring, and for the most part yield to confinement to the house for a day or two, and the antiphlogistic regimen. The latter affection, like the former, is of little importance, unless considered in connection with laryngitis, which has sometimes commenced like an ordinary sore throat attended with hoarseness; or unless it give rise to chronic disease of the affected part; for it is observable of both these slight inflammatory attacks, that when neglected, or when, from exposure to frequent vicissitudes of temperature, to foggy and cold weather, or to the night-air, they are from time to time renewed, a state of permanent irritation is sometimes produced which is indicated by hoarseness, slight muco-sibilant inspiration, and cough, and by some difficulty of swallowing; symptoms which, especially in persons advanced in life, end in chronic laryngitis, a disease always intractable and often fatal. In these attacks, relief, if sought in time, may in general be obtained by bleeding, especially topically, and blistering; by a course of calomel and ipecacuanha, or calomel and antimonial powder, one grain of each given three times a day, and continued until the gums become slightly affected by the mercurial; by pure air of moderate and equable warmth; and rest and quiet.

3dly. Sometimes the membrane of the larynx is inflamed in gastric fever, and in various fevers of the exanthematous order, especially in small-pox, measles, scarlatina, and erysipelas, fevers which we apprehend are all essentially gastric. In small-pox, the epiglottis and larynx are often inflamed and beset with pustules, from which very great distress arises. In the beginning of measles, inflammation of the upper part of the windpipe is so considerable as to give rise to an attack which, for a short time, advances with all the violence of croup. In the winter of 1807, and more especially in the spring of 1808, when measles were epidemical in Edinburgh and the neighbourhood of that city, and of so unfavourable a kind that we witnessed the death of more than 100 patients in the course of a few months, the disease corresponding with the putrid measles of Watson, (Med. Obs. and Inquiries, vol. iv. p. 132,) not only was the larynx often affected before the efflorescence took place, but in several instances after the rash had disappeared it became inflamed; in all which cases, to the best of our recollection, the patients died. In one dissection which we procured, of laryngitis after measles, the following were the appearances discovered. The investing membrane of the epiglottis was considerably thickened, particularly at its edges; such also was the state of the membrane of the glottis; the sacculus laryngeus was nearly obliterated, and, below the sacculus, ulceration had taken place. When the epidemic commenced, bleeding was often useful, but after it had continued for some time, and had become more fatal, the attending fever being typhoid, bleeding appeared injurious; indeed we then observed that scarcely a child recovered which had been bled, so that bleeding was not had recourse to when the larynx became inflamed. Nor were blisters applied, most blistered surfaces having a strong tendency to run into ulceration and gangrene. Were we again to be called to such cases, we would recommend immediate change of dwelling, a remedy not yet duly appreciated in acute diseases; an emetic and calomel, with small additions of opium.

We have frequently known inflammation in scarlatina and in some forms of cynanche to affect the fauces, whereon perhaps a plastic membrane was formed, and to ascend into the nares and descend into the windpipe. Several soldiers of a militia regiment, stationed at Woolwich, were daily brought into the general hospital with scarlatina. The disease was unusually fatal. One

* A very interesting account is given (in the Medico-Chirurgical Review, for July 1832) by Dr. Kennedy of Ashby-de-la-Zouch, of Judith Waterford, of that place, and now alive, with milk still in her breasts at the age of eighty-one: the summary may be given in Dr. Kennedy's own words. "Here, then, are the remarkable circumstances of a woman who menstruated during lactation, who suckled children (many not her own) *uninterruptedly* through the full course of *forty-seven* years (three years of which time she was a widow), and in her eighty-first year has a moderate but regular secretion of milk."

of these patients, who had been only a few hours in the hospital, died after symptoms which the surgeon on duty thought proper to investigate by dissection. He cut out the trachea, and found it lined with a membrane as in croup. The preparation was preserved, and afterwards presented to the writer of this article by his late friend Dr. Rollo, surgeon-general to the artillery: an engraving of it was given by the writer in his work on the "Pathology of the Membrane of the Larynx." At page 37 of the same work, will be found an account of two cases of inflammation of the larynx, one occurring about the eighth or ninth day of fever in a girl eight years of age, who was relieved by bleeding; the other in a girl of eleven, in whom an attack of bilious remittent fever was ushered in by laryngeal inflammation. A fatal case of laryngitis occurring during apparent convalescence from remittent fever, published in the first volume of the Transactions of the Physico-Medical Society of New York, was republished in the Medico-Chirurgical Review for April, 1827.

In erysipelas the fauces are often inflamed, and the inflammation extends to the larynx, in which case the respiration resembles that of croup, and the disease is generally fatal. A female thirty-four years of age, had been in the hospital at Cochin for disease of the heart, when, on the 23d of February, she was seized with violent rigor; 24th, erysipelatous eruption of the face with febrile re-action; 25th, 26th, the erysipelas was extended to the hairy scalp and to the neck, eyes closed; 27th, acute pain in the throat, difficult deglutition, respiration impeded; 28th, swelling and inflammation in the anterior part of the throat; inability to expectorate; suffocation threatened. March 1st, swelling of the neck enormous —asphyxia—death.

Dissection.—The mucous membrane lining the mouth, larynx, and pharynx, red and inflamed. The epiglottis and its ligaments thickened; the rima glottidis nearly annihilated by the swelling and by tough mucus. The cellular tissue of the larynx, face and neck injected, red, and œdematous; the lungs sound. (*Bouillaud.*)

4thly. The larynx is often inflamed in those diseases in which the inflammation extends over the whole of the mucous membrane of the lungs. In common and also in epidemic bronchitis, the inflammation, apparently commencing in the Schneiderian membrane and fauces, often affects the larynx in its descent into the bronchi. The membrane of the larynx is also liable to be affected in those varieties of chronic bronchitis, which, according to the season or age at which they occur, or according to the symptoms of the attack, have been termed winter cough, catarrhus senilis, suffocative catarrh, or peripneumonia notha. In pertussis, inflammation often obtains in the mucous membrane of the larynx as well as in that of the trachea and bronchi. Lastly, in croup, the symptoms referable to inflammation of the larynx are so obvious and remarkable as to have exclusively engrossed the attention of most observers, leading them to overlook proofs, scarcely less equivocal, of an inflamed condition of the bronchi.

5thly. We have known many cases of inflammation of the glottis arising from an accident, to which the children of the poor are liable. Slatternly mothers often permit their children to drink from the spout of the tea-kettle, and the children are thus led to a habit which, if the kettle should happen to contain boiling water, may prove fatal. The symptoms produced by this accident are inflammation and vesication of the fauces, difficult breathing, audible inspiration, whispering voice, leaden countenance, watery eyes, and cold extremities — symptoms which we were wont to think were as much dependent upon bronchitis as upon inflammation of the glottis; but a dissection published by Dr. Marshall Hall, in his satisfactory account of this affection in the twelfth volume of the Medico-Chirurgical Transactions, would lead to a conclusion that the inflammation does not extend even to the trachea. We have been accustomed to treat this affection by bleeding, blistering, and a preparation of calomel and ipecacuanha. Our confidence in bleeding is not, however, very great. The children soon acquire that peculiar expression which livid paleness with œdema imparts, when asphyxia, in an advanced state of bronchitic inflammation, is impending, a state which contra-indicates free bleeding. Bronchotomy is recommended by Dr. M. Hall, and this operation his view of the case would amply justify. He also recommends scarifying the epiglottis. Probably small doses of opium, given at an interval of two or three hours, would be useful, as they generally are in burns attended with much suffering. In the third volume of the Dublin Hospital Reports there is a case given by Dr. Burgess, of a girl of three years of age, who drank boiling water from the pipe of a tea-kettle, by which great swelling of the parts immediately ensued, thereby preventing deglutition and impeding respiration. In about two hours after the accident, in looking into the mouth, it appeared as if a large piece of raw flesh had been forced into the fauces, and had completely filled up the passage. Respiration was performed with very great difficulty, and was rapidly becoming more laborious,—in fact the child appeared to be dying, when bronchotomy was performed, by which life was saved.

6thly. Inflammation of the mucous membrane of the larynx sometimes arises when the system is under the influence of mercury. We think we have seen inflammation extending to the windpipe in severe cases of mercurial glossitis, and hence we are unwilling to reject, as one of the species of laryngitis, that caused by mercury. But we are not satisfied that the cases of alleged mercurial laryngitis, which have been recently published, did not owe their origin to other influences, such as lues venerea, or exposure to cold, rather than to the mercury.

7thly and 8thly. There are yet two inflammatory affections of the membrane lining the larynx which must be briefly described, in order to complete this part of the subject: these are scrofulous inflammation of that portion of the mucous membrane, and inflammation symptomatic of secondary syphilis.

Scrofulous inflammation is an affection of a very dangerous nature, not, as we apprehend, generally accompanied with tuberculated lungs

This affection is not confined to youth or adolescence; sometimes it appears at or after the meridian of life, as the commencement of a very chronic variety of phthisis, which some physicians have imagined depends upon indigestion, and is to be cured by blue pill, &c. We have frequently witnessed this affection in an acute form in persons who had abandoned themselves to the habitual use of ardent spirits, in *muddlers*, as they are called, who drink at all times, but seldom to complete intoxication. Such patients lose their appetite; become emaciated; usually have a patchy purplish complexion; gradually acquire a dry hard cough, which at first appears nothing more than an aggravation of that cough observable in drunkards, which is attended with white and scanty expectoration, and is followed, especially in the morning, by retching or even vomiting of a little clear ropy fluid. If we examine these patients, we shall find the pulse accelerated, the tongue and fauces florid, the former glazed. This disease is always fatal, but generally not until purulent expectoration, colliquative diarrhœa, and night sweats, have existed for some time. It often is to be met with in publicans, and such as are engaged in the occupation of vending ardent spirits. It is attended with a sense of exhaustion, a depression of mind, a fear of death, and a consciousness of the disease being self-produced, which it is most painful to witness. The patient may, in the commencement, derive some advantage from change of air, exercise on horseback, very small topical bleedings, not more than three or four leeches being applied, followed by counter-irritants and light bitters. The bowels must be properly regulated, avoiding all medicines which lower the strength; and a mild alterative pill may be given for ten days or a fortnight, namely,

℞ Pilulæ hydrargyri, scrupulum.
Pulveris conii, scrup. ii.
Ipecacuanhæ, gr. xv.

Ammoniaci contriti, sesquidrachmam, M. et divide in pilulas xl. Sumat duas mane et meridie; superbibendo poculum lactis asinini.

Milk, shell-fish, broiled, tender but lean meat, and vegetable jellies will form the most suitable nourishment.

The more common form of scrofulous inflammation of the larynx and trachea belongs to youth, and occurs in those families of which the members are liable to consumption. It has seemed to us often to arise from night-air and fatigue, especially when these causes operate during a season of mental anxiety and over-exertion. This is a frequent disease with those wretched females who frequent the streets of our cities in the night, and their obscene haunts during the day. The hue which may be observed on their cheeks is not always the glow of intemperance or of shame, nor yet the factitious blush of effrontery, but is often the crimson of a consuming hectic, which is rapidly hurrying them from misery to misery. It is little known how large a portion of the tenants of the brothel actually labour under consumption: but the subject is too horrible to be pursued.

At first the disease is attended with a dry barking cough, a single bark, often supposed to be a stomach cough; but the symptom which is most distinctive of this very treacherous complaint, and which in consumptive families ought ever to excite the liveliest apprehension of danger, is a change in the sound of the voice, which the patient can no longer extend without difficulty. It is slightly raucous, and acquires that hollowness which, both as if proceeding from a vault and in reference to its tendency, is not unaptly called sepulchral. When, the attention being arrested by the cough and the sound of the voice, which often have existed for many weeks or even months before they become objects of regard, we more closely examine the patient, we shall find that there is some uneasiness in the region of the larynx, or in the superior part of the thorax; a degree of quickness of the pulse is discoverable, as also some emaciation and decay of the strength, but the latter so slight as to have escaped notice. Indeed so insidious is this disease, that in many instances it has passed undiscovered until some acquaintance, who had not for a considerable time seen the patient, discerning a great change in his looks, expresses his apprehension. Then the truth, in all its nakedness, flashes on his alarmed relatives, and a physician is obtained who detects the nature of the disease by discovering that there are irregular chills followed by heats and perspirations, and confirms all their fears. The patient soon loses the power of extending his voice; he can only speak in a whisper; his cough becomes stridulous, his expectoration purulent, and laryngeal or tracheal consumption is incurably established. If a patient, fortunately for himself, should in the commencement of his disease be visited by a person possessed of medical skill, his life may sometimes be saved. In the treatment of this complaint, if the disease should not have reached the suppurative stage, we must disregard the diathesis, and address ourselves to the local affection. First, we must apply leeches to the upper part of the sternum; we prefer three or four leeches every third or fourth day to a greater number; secondly, the tartar-emetic ointment (taking care that it does not reach the leech-bites) to the sides of the larynx, first to one side and then to another; thirdly, we must give the solution of tartar-emetic (so as to excite slight nausea) with the addition of nitre.

℞ Antimonii tartarizata, gr. duo.
Nitratis potassæ, scrup. ii.
Aquæ distill. unc. sex: M. et divide in haustus sex. Sumat unum, ter, quaterve de die.

Lastly, a diet consisting of milk, farinacea, and fruits, will be necessary. This plan may be followed for eight or ten days; if without efficacy, new measures must be tried, as change of air and scene, and restoratives, such as a return to the use of animal food, a glass or two of claret, and sponging the surface with very diluted nitro-muriatic acid, which may also be taken internally. If the expectoration be considerable, a drachm of Riga balsam in a glass of water may be taken three times a day, or the following draught:

℞ Tinct. benzoini compositæ, ʒi.
Mucilaginis acaciæ, ʒii.
Syrupi papav. albi, ʒi.
Aquæ cinnamomi, ʒvi. M.

together with such treatment as would apply to impending laryngeal or tracheal phthisis.

There are certain cases of scrofulous inflamma-

tion of the windpipe that are invariably overlooked in the first stage, of which the first symptoms detected are round and pretty deep ulcers in the fauces. The affection of the larynx so commencing, according to our observation, always ends in phthisis.

The syphilitic inflammation of the larynx, like the last variety, is seldom discovered in its very beginning. This disease is introduced by anomalous symptoms of constitutional disorder, and an obscure febrile state. The patient's expression appears altered and anxious, his complexion pale or mixed, his skin opaque and, as it were, dirty, his eyes hollow, the tarsi slightly inflamed; some degree of emaciation takes place; then the voice becomes husky. These symptoms will naturally suggest that line of inquiry which we adopt when we are endeavouring to detect a syphilitic taint; and here it will not be irrelevant to observe that a change in the sound of the voice, whenever it accompanies a cachectic state of the body, demands the utmost attention,—attention which will sometimes be rewarded by enabling us to discover the approach of a disease that would shortly assume a hopeless expression. In syphilitic inflammation of the larynx, when the head is suddenly turned to a side, uneasiness will be felt in the organ, which, when pressed, feels tender. The patient suffers much from a stridulous cough, attended with little or no expectoration. These symptoms being neglected, ulceration of the membrane of the larynx next ensues, which may be discovered by difficult and suffocative inspiration and cough, by purulent expectoration, and by unequivocal hectic, attended with great irritability of the nervous system, and, lastly, by permanent loss of voice. In the commencement of this affection, we must endeavour to subdue the inflammation by means of leeches, blisters, and the antiphlogistic regimen. Then we must give the muriate of mercury in decoction of sarsaparilla, and employ mercurial fumigations.

In this manner, with the help of change of air, a remedy often of surprising efficacy in specific inflammations, a cure may sometimes be accomplished; but syphilitic inflammation of the larynx, which we apprehend will be most likely to occur in strumous habits, will, in general, like the proper scrofulous inflammation, terminate in laryngeal consumption, unless a termination should take place in the inflammatory stage, such as was exemplified in one of Bouillaud's patients, who died of suffocation so early as the fifth day, the cellular membrane being so thickened, infiltrated, and gorged, as almost to obliterate the rima glottidis; and on the left side of the larynx an ulceration being formed with the characters of chancre. (Med. Chir. Journ. for July, 1825, p. 206.) When syphilitic ulcers exist, they will generally be found in the sacculi laryngis. We have, in a specimen of diseased larynx, seen fimbriated excrescences in the glottis, which were probably syphilitic, but we were not able to obtain a history of the preparation.

As we learn from an ably written paper by the late Mr. Wood, in the seventeenth volume of the Medico-Chirurgical Transactions, on the effects of inflammation of the larynx, that a patient lately died in St. Bartholomew's Hospital, of a disease of the larynx, which was discovered after death to be cancerous; and as Dr. Monro, in the 2d volume of his Outlines of Anatomy, informs us that he has seen in some cases the arytenoid and thyroid cartilages thickened and covered by a scirrhous substance, by which the glottis was straitened; it is probable that our successors in pathology, when facts accumulate, will add a *ninth* species, viz. scirrhous inflammation of the larynx, to the foregoing catalogue of diseases of that organ.

We proceed to the consideration of laryngitis, which is a more suitable designation for the disease now under review, than *angina œdematosa*, as applied to it by some authors: it has been well observed that "the term *œdematosa* is unnecessary, as œdema constitutes no fundamental character of laryngitis, but is an effort or consequence of inflammation of the affected organ," (Med. Chir. Journal for July, 1825, p. 206,) in what manner soever excited.

Of laryngitis, it is true, notices and cases were previously published, but the disease was not generally understood prior to the publication, by Dr. Farre, of a valuable paper on cynanche laryngea, in the third volume of the Medico-Chirurgical Transactions.

Our knowledge will often be advanced by examining a specimen of a disease before we apply ourselves to the study of its general history. We therefore beg to call the attention of the reader to a case of laryngitis in every way interesting, but especially so to the pathologist, as being the first accurately reported history of that disease which, as far as we know, is to be found in the annals of medicine.

"Some time on the night of Friday, the 10th December, 1799, having been exposed to rain on the preceding day, General Washington was attacked with an inflammatory affection of the upper part of the windpipe, called in technical language cynanche trachealis. The disease commenced with a violent ague, accompanied with some pain in the upper and fore part of the throat, a sense of stricture in the same part, a cough, and a difficult rather than a painful deglutition, which were soon succeeded by fever and a quick and laborious respiration. The necessity of bloodletting suggesting itself to the General, he procured a bleeder in the neighbourhood, who took from his arm in the night, twelve or fourteen ounces of blood. He could not by any means be prevailed on by the family to send for the attending physician till the following morning, who arrived at Mount Vernon at about eleven o'clock on Saturday. Discovering the case to be highly alarming, and foreseeing the fatal tendency of the disease, two consulting physicians were immediately sent for, who arrived, one at half after three, and the other at four o'clock in the afternoon. In the mean time were employed two pretty copious bleedings, a blister was applied to the part affected, two moderate doses of calomel were given, and an injection was administered, which operated on the lower intestines; but all without any perceptible advantage, the respiration becoming still more difficult and distressing. Upon the arrival of the first of the consulting physicians,

it was agreed, as there were yet no signs of accumulation in the bronchial vessels of the lungs, to try the result of another bleeding, when about thirty-two ounces of blood were drawn, without the smallest apparent alleviation of the disease. Vapours of vinegar and water were frequently inhaled; ten grains of calomel were given, succeeded by repeated doses of emetic-tartar, amounting in all to five or six grains, with no other effect than a copious discharge from the bowels. The powers of life seemed now manifestly yielding to the force of the disorder; blisters were applied to the extremities, together with a cataplasm of bran and vinegar to the throat. Speaking, which was painful from the beginning, now became almost impracticable; respiration grew more and more contracted and imperfect, till half after eleven on Saturday night, retaining the full possession of his intellect, when he expired without a struggle. He was fully impressed at the beginning of his complaint, as well as through every succeeding stage of it, that its conclusion would be mortal; submitting to the several exertions made for his recovery, rather as a duty than from any expectation of their efficacy. He considered the operations of death upon his system as coeval with the disease; and several hours before his death, after repeated efforts to be understood, succeeded in expressing a desire that he might be permitted to die without further interruption. During the short period of his illness, he economized his time, in the arrangement of such few concerns as required his attention, with the utmost serenity; and anticipated his approaching dissolution with every demonstration of that equanimity for which his whole life had been so uniformly conspicuous."*

The violent ague with which this case commenced was doubtless the rigor of incipient inflammation; the pain in the upper and fore part of the throat, the sense of stricture in the same part, and the labour of respiration, showed that inflammation was seated in the larynx. The difficult deglutition arose from the state of the tonsils, in which probably the inflammation commenced. The inflammation did not descend into the bronchial vessels of the lungs, wherein we are told there were no signs of accumulation. It may be inferred, therefore, as will be apparent from the sequel, that this was a genuine specimen of laryngitis.

Laryngitis generally arises from exposure of the body, or a part of it, to cold or wet, or from sudden transitions of temperature. It affects those persons who are liable to cynanche tonsillaris, and often commences as one of their accustomed attacks; and hence the patients are seldom alive to danger until a feeling of suffocation convinces them that their illness is one of unusual severity. In the Richmond Surgical Hospital, House of Industry, Dublin, we saw a case of inflammation of the larynx, which commenced in the tonsils, and was by malpractice extended to the larynx. The patient was a robust young man; his face was much flushed, his pulse quick. He was completely hydrophobiac. When he tried to swallow, the effort was followed by extraordinary difficulty of inspiration, and every attempt to articulate was productive of a sense of strangling. There were pain and great tenderness on pressure on either side of the pomum Adami. He was attacked, two days before he entered the hospital, with cynanche tonsillaris, when an old woman, partial to stimulants, as such practitioners generally are, rubbed the inflamed tonsils with pepper and salt, and immediately difficult deglutition came on, which was followed by constriction of the glottis. He fell under the care of an excellent surgeon, the late Mr. Todd, who soon restored him to health by copious general and local bleeding.

If, when the throat first becomes sore, the patient is examined, probably the uvula will appear inflamed, and the tonsils and arch of the soft palate redder than natural; and in some few instances exudations of coagulable lymph will be seen on those parts; the tongue perhaps is swelled; the face flushed; the pulse frequent, full, and hard; and the skin hot. The breathing soon becomes affected; the inspiration "is long in being completed," audible, and as if the air were drawn through a dry and narrow reed; the patient points to the larynx as the seat of uneasiness; he frequently coughs, and the cough is very peculiar in sound, not so ringing as that of croup, but harsher and more stridulous, and attended with scanty, viscid, and transparent expectoration. Pain is sometimes complained of in the chest. The voice, at first acute and piping, gradually becomes thick, then hoarse and whispering, and at last it is completely suppressed. There is sometimes great difficulty in swallowing, from the epiglottis ceasing to perform its valvular office, whence it happens that, when the patient begins to drink, a portion of the fluid escapes into the larynx, and produces a fit of coughing, which seems to threaten instant suffocation.

Laborious respiration and an inadequate supply of air before long affect the appearance of the patient. His expression becomes full of anxiety; his countenance pallid; his lips leaden; his eyes protruded and watery; his pulse is quick, feebler, and less uniform; and the surface of his body colder. Sometimes the integuments which surround the larynx, especially in the fore part of the neck, are swollen. In a case operated upon by Mr. Macnamara of Dublin, the trachea was laid bare at a depth of two inches and a half below the surface, to such an extent had the integuments of the neck become œdematous. The patient is restless and apprehensive, often changing his position, in the vain hope of obtaining relief; walking or rather staggering to and fro, or from one room to another, in great distress: feeling that he is on the point of suffocation, he cannot be ignorant of the danger to which he is exposed; hence he is willing to submit to any means of relief, and is impatient of delay.

In this stage of the complaint the patient seldom sleeps for many minutes at a time; when he begins to doze, he starts up in a state of the utmost agitation, gasping for breath, every muscle being brought into action which can assist respiration, now a convulsive struggle. He is quite enfeebled, becomes delirious, drowsy, and at last comatose,

* This account is dated Alexandria, Vir., Dec. 21, 1799, and signed by Dr. James Craik, attending physician, and Dr Elisha E. Dick, consulting physician.

the circulation being more and more languid, and he dies on the fourth or fifth day of the disease, or even earlier. Instances have come to our knowledge in which the disease has terminated fatally within twelve hours, (one of Dr. Armstrong's patients died in eight hours, and another in seven;) and therefore, if a person dies suddenly in the night, who had complained on the foregoing day of sore throat, laryngitis may be suspected as the cause of his death. Instances have also come under our observation, in which the disease has lasted three or four weeks, of which the following case is an example.

We have inserted the first recorded case of laryngitis, that of General Washington; and we beg to insert the first case of the disease recorded as such.* In so doing, the reader will obtain a glimpse of the second Monro, who, at a time when the most eminent of his contemporaries in England were ignorant of its existence, perfectly understood and explained to the writer of this article the nature of laryngitis.

Mr. A. æt. forty-three, robust and corpulent, in the spring and summer of 1805 was for three months under a mercurial course for secondary symptoms of syphilis. In spring 1806, he was affected with fever and pains in his limbs. In July 1806, he laid aside his flannel shirt, and thought he caught cold. July 10th, severe fits of coughing in the night; 11th, 12th, 13th, troublesome nights from the cough. V. S. ad ℥xvi. 14th to 19th, emetic, squills, opiates; 20th, respiration not quickened, but difficult, constriction felt in the larynx; long-continued fits of stridulous cough; tongue white and swelled; pulse 120; by an effort he can completely inflate the lungs without raising a cough. On this day the patient was first seen by the writer of the case, at whose request Dr. Monro was called into consultation, whose opinion was *that the symptoms arose from inflammation and thickening of the mucous membrane of the windpipe.* Twelve leeches to the left of the windpipe, and a blister to the right, pulv. jalapæ comp. ℥ss. calomelanos gr. v. July 22d, during the night he slept not many minutes at a time; cough threatening suffocation; expectoration of clear ropy mucus; hissing inspiration; tongue furred and swelled; evident fulness as well as tenderness on the left side, and in front of the thyroid cartilage, which is painful when the head is turned. When in bed his head is low, and thrown to the left side; when sitting, his chin is projected; countenance anxious. Opinion: *as the disease appears to be confined to the upper part of the windpipe, it was resolved, should suffocation be imminent, to perforate the larynx between the thyroid and cricoid cartilages.*— Leeches, blister, steam of warm water and vinegar. July 24th, miserable nights; often on the point of suffocation; pain on pressure in every part of the trachea, pulse 128; tongue more swelled. July 27th, in the last three days a pound of blood was drawn each day. The first blood sizy and cupped. Laudanum produced sleep, but he awoke gasping, dyspnœa being then more severe. Sometimes he started from his chair, and staggered from one room to another; then his face was quite livid; his pulse, an hour after a paroxysm, was 136. Tongue swelled, and indented from the impression of the teeth. Emetic of ipecacuanha proved nearly fatal. When he began to vomit, his inspiration was interrupted and crowing; his face was pale, and his lips livid. Gr. ii. calomelanos ter quotidie. Evening, haustus cum tinct. opii et vini ant. gutt. x. August 4th, sickness after the evening draught, which lasted all night. At 7 A. M. breathed with great difficulty; extreme cold. He was taken out of bed and seated on a sofa, supported with cushions and pillows, after which his head fell upon his breast, and he ceased to respire. When his head was raised, respiration was resumed, but it was stertorous, and his complexion was changed from the purple of imperfect respiration to the paleness of a cadaver. Bronchotomy was performed without effect; he died in about two hours after the operation. We were not permitted to examine the body, but concluded that death arose from closure of the rima glottidis, owing to *thickening of its lining membrane.*

At one time it was conjectured that this case

* Abridged from the Pathology of the Larynx and Bronchia, by J. Cheyne, M. D. Edin. 1809.

May we be permitted to introduce Dr. Monro to the student of pathology as a physician worthy of the closest imitation. In his writings we have somewhat too much of the ardour of controversy, into which he was betrayed in support of his reputation as a physiologist, ungenerously assailed; but in the common intercourse of professional life he was scrupulously correct in conduct, and in his manners urbane. He was a strict economist of time,—a man of industry and order. His mind was unceasingly occupied in the acquisition of knowledge, so that no allurement, not even the pleasure of his garden, for which he had a genuine relish, was permitted to seduce him from his daily task of recording the results of his observation, by carefully arranging and registering the facts which he judiciously collected; and hence, after he had passed the common period of life, when between his seventieth and eightieth year, he was still to be found in his study, with his case-book before him, adding to his stock of pathological knowledge. In the investigation of disease he could not be viewed without admiration. His digested experience, his keen observation, and the excellent method of inquiry which he pursued, rendered him a personification of medical sagacity, and enabled him, in consultation, to tower above the great competitors of his youth and age, the one a man of genius, the other of talent—Cullen and Gregory, who were children compared with Monro in the power of discovering the nature and predicting the course of an obscure and uncommon disease. He was remarkable for the possession of tact, employing the term not merely as expressive of discrimination, but also of that quality which, in the exploration of diseases in the thorax, abdomen, and pelvis, enables the physician, by manual examination, to detect the nature of the altered structure of the organs contained in these cavities. Monro, in his inquiries, brought not merely his touch, but all his senses to his aid in an extraordinary manner. Long before the time of Laennec he availed himself of the aid of auscultation (immediate) in ascertaining the existence and nature of diseased conditions of the heart. We have known him sit for a long time, with his ear applied to the thorax, deriving information from a mode of inquiry at that time peculiar to himself. Finally, though remarkable for caution, he possessed great decision of character, of which his practice, never rash, but often extremely bold, afforded sufficient evidence. The therapeutic agents which he employed were skilfully combined, and while mere effect was despised by him, while

> "His vigorous remedy displayed
> The power of art without the show"—

nothing was omitted in weak compliance with the prejudices of his patient. This sketch will be pardoned by all those who think that, even with advancing age, there ought to be no abatement of zeal in the cultivation of professional science; that improvement in all things is promoted by placing models of excellence before the eyes of the student; and that an expression of gratitude is seemly. The writer, having derived many useful lessons from studying the character of Monro, has never lost an opportunity of paying an humble tribute to his memory. It appears surprising that this great pathologist should have been allowed to retire from the theatre of his usefulness without receiving one valedictory plaudit.

was connected with syphilis; but if such a complication had existed, it is probable that the inflammation would, in four weeks, have reached the ulcerative stage, of which the expectoration afforded no evidence. This case, with several others which fell under our care, induced us to attempt a definition of the disease in the following terms. "Pain in the larynx not very acute, unless on pressure; some degree of fulness externally; a change in the sound of the voice, difficult and even crowing inspiration, but slow rather than quick; an altered, sometimes stridulous voice; fits of suffocative coughing; and all those symptoms which arise from obstructed circulation in the lungs." (Vide Pathology of the Larynx, p. 161.)

Causes.—Persons advanced in life are more liable to laryngitis than the youthful; and of the former the disease most frequently occurs in such as are liable to indigestion, connected with a disordered condition of the liver. Several of our patients had been habitually intemperate. The exciting causes of laryngitis, as we have already mentioned, are such as usually are productive of common cynanche or catarrh, the principal being exposure to cold.

Prognosis.—In some new cases of laryngitis the inflammation recedes, and the disease terminates favourably. This favourable change we may presume is taking place when we discover that the swelling of the epiglottis is subsiding, that the difficulty of breathing and pain of the larynx are abating, and when freedom of expectoration is restored, and deglutition becomes easy. On the other hand, the danger increases with an increasing struggle of breathing. Paleness and lividity of the complexion, a prominent watery eye, and lethargy or stupor, are symptoms which indicate great urgency of danger. It may fairly be affirmed that laryngitis is the most fatal of the phlegmasiæ; consequently the prognosis, in every stage of the disease, must be delivered with the utmost caution. "Of seventeen cases of laryngeal angina observed by Bayle during six years, only one ended favourably."

Diagnosis.—The diseases which are most liable to be mistaken for laryngitis are—

1. Ossifications and caries of the cartilages of the larynx. This state of these bodies gives rise to extensive ulceration, of which the diseased cartilage is the centre. This affection is often of slow growth, beginning with uneasiness in the region of the larynx, followed by hoarseness; then occur cough, difficulty of breathing, which is croaking, sibilous, and in paroxysms; and difficulty of swallowing; purulent expectoration, which is often of extraordinary fetor; sometimes diseased portions of cartilage on which the fetor depends, being expectorated. We learn from Dr. Monro's Outlines of Anatomy, that the cartilages of the larynx, especially the thyroid, and sometimes even those of the trachea, are occasionally found ossified. In examining the body of an old man, who for the last six years of his life had been subject to a severe and almost unremitting cough, "I found," says Dr. Monro, "the cartilages of the larynx ossified, a considerable quantity of viscid mucus within the trachea, and its internal coat thickened, spongy, and red. In such cases the mobility of the different component parts of the larynx being lessened or destroyed, the voice becomes much feebler; and there have been instances, as I have been informed by my father, of these morbid ossifications exfoliating internally, and portions of the bony matter expelled by coughing." By a patient labouring under disease of the cartilages of the larynx, who was under the care of Dr. Colles of Dublin, one of the arytenoid cartilages was expectorated; and Dr. Hunter, as we learn from Dr. Baillie, "knew an instance in which the cricoid being converted into bone was separated by exfoliation, and afterwards coughed up." Abscesses thus formed sometimes burst into the œsophagus, sometimes into the cavity of the windpipe, and sometimes they open externally. When the patient escapes sudden suffocation, this disease, which admits of treatment similar to that of simple laryngitis, usually ends in hectic fever. In general it is not attended with inflammation of the epiglottis, and instead of terminating within four or five days, its course is tardy. To this disease, rather than to simple laryngitis, we apprehend belonged the case of the Right Hon. Isaac Corry, as detailed by the late amiable and accomplished Dr. Edward Percival, in the fourth volume of the Medico-Chirurgical Transactions. In Mr. Corry's case, as we learn from Dr. Colles, who was one of his attendants, the epiglottis was in a natural state, and the rima glottidis little if at all reduced in its capacity. Of the same nature appears to have been the first of Mr. Lawrence's cases, published in the sixth volume of the Medico-Chirurgical Transactions, and the case furnished by Dr. Latham, and published in the same paper, in which, on dissection, there were found two distinct ulcerations through the substance of the thyroid cartilage, which contained pus. Mr. Goodeve's case, published in the London Medical Journal, July, 1825, was probably of the same nature, as the patient's voice and respiration improved after the expulsion of a piece of bone from the glottis.

2. Abscesses in the vicinity of the windpipe, compressing that tube, are sometimes formed in the neck, under the fascia, and are discoverable by hardness, swelling, and pain on pressure, œdema, and inability to open the mouth widely; they are often accompanied with fever of a typhoid nature, which we have more than once considered as the primitive disease;* but as, by an incision, relief may occasionally be obtained, the treatment chiefly belongs to surgery. The usual situation of these abscesses, according to Mr. Porter, is behind the broad portion of the cricoid cartilage, where it presses on the rima glottidis. The progress of this disease is sometimes rapid; sometimes the abscess bursts behind the rima glottidis, and hectic ensues.

3. It will be necessary to recollect that aneurismal tumours have given rise to symptoms resembling those of laryngitis, of which there is an example in Mr. Lawrence's paper. We learn from that eminent surgeon, that a patient laboured under great difficulty of drawing air into the chest, coming on in fits, which Mr. Lawrence supposed

* These abscesses are frequently fatal, as in a case related by Dr. Tweedie, which occurred during convalescence from fever. Dr. Tweedie has also met with cases of symptomic laryngitis, both in continued and scarlet fever, which generally rapidly destroys life, by causing œdema of the glottis.—*Clinical Illustrations of Fever.*

might be relieved by bronchotomy, and therefore he desired that he might be sent for on the occurrence of a fit. After the patient's death, her disease was found to be an aneurism of the arteria innominata, situated between the first bone of the sternum, and pressing on the trachea. Mr. Wood knew an instance, in which tracheotomy was performed, which was attended with bursting of the aneurism into the trachea, and he refers to several such cases.

Pathology. — In several dissections which we have superintended, we have observed appearances corresponding with those described by Drs. Farre and Baillie, and Mr. Porter. Swelling, and other remains of inflammation of the tongue, velum, arch of the palate, and fauces, may occasionally be seen. The following appearances are always visible. The epiglottis thickened and erect, by which it ceases to protect the aperture of the windpipe; the mucous membrane of the glottis and larynx, as well as the epiglottis, thickened and vascular; underneath the mucous membrane, an infiltration of serum. This thickening of the mucous membrane and distension of the submucous tissue, from inflammation and effusion, bring the sides of the rima glottidis nearly into contact, and thus at length almost obliterate the passage.

Coagulable lymph has occasionally been found on the free surface of the mucous membrane. In the second case, related by Dr. Farre, in the third volume of the Medico-Chirurgical Transactions, coagulable lymph was effused from the inflamed surfaces about the glottis and epiglottis, and thus assisted in closing the rima. The tumefaction of the mucous membrane generally ceases at the junction of the larynx and trachea, but increased vascularity may sometimes be discovered in the trachea and bronchi.

The two phenomena which invariably characterize the anatomy of laryngitis, (the latter a consequence of the former,) are—1st, inflammation and some thickening of the mucous membrane; and 2dly, œdema underneath, which latter state, although it cannot be called peculiar to this affection, is a very unusual attendant upon any other disease of the mucous membrane.

[M. Cruveilhier divides laryngitis into two varieties, according as the diseased action is more conspicuous upon the surface of the mucous membrane of the larynx, or in the submucous cellular tissue, designating the former *mucous laryngitis*, the latter *submucous laryngitis*, which is the *œdema of the glottis* of others. In the consideration of this disease elsewhere, (*Practice of Medicine*, edit. cit. i. 227,) the writer has divided laryngitis into the *acute*, the *chronic*, and the *œdematous*.]

That laryngitis is an inflammatory affection, we have abundant proof. The fever which belongs to the disease is attended with increased heat of surface, and frequent and strong pulse. The blood is sizy. The parts affected are swelled and painful, and we may sometimes obtain a view of a portion of the affected organ in a state of intense inflammation. When the tongue is not much swelled, by depressing its root, by pushing the root downwards and forwards by means of a spatula, elevating at the same time the handle of the spatula, we can discover the epiglottis erect, florid, swelled, and rounded. One writer on the disease has well described the epiglottis as being enlarged, red, glossy, and nearly of the size and appearance of a plum (*Mr. Wilson*, vol. v. Medico-Chirurg. Transactions, p. 158): inflammation, thus denoted by swelling and glossy redness, is, doubtless, the state of the glottis as well as of the epiglottis.

Mere inflammation of the membrane will be productive of uneasiness and occasional difficulty of breathing, from spasmodic stricture. But effusion into the submucous tissue must render the difficulty of breathing permanent, and lead to asphyxia, when, from narrowing of the glottis, the supply of atmospheric air becomes insufficient to effect the removal of the venous character of the blood during its passage through the lungs, and when, consequently, those functions which depend upon the arterial properties of the blood being restored, and more especially the function of the brain, are interrupted.

In laryngitis, asphyxia may take place under a variety of circumstances. 1st. We have known asphyxia take place, in the course of the first night of the disease, from strangulation, the patient being found in the morning quite dead. 2dly. Asphyxia much more generally arises from gradual depravation of the circulating fluid. 3dly. Death may also take place after the obstruction has been removed by means of a surgical operation, as in the case of Mr. A. In such case, the brain, in consequence of the transmission to it of blood in a state of imperfect oxidation, receives a shock from which it never recovers, even when the lungs are again abundantly supplied with air. This is like the shock from submersion, which we have known to be fatal after the pulse and respiration had been restored. In the two latter cases, the patient dies from disease of the brain, and not from strangulation. Œdema productive of death may be the work of one night; yet, generally, the morbid process is prolonged for four or five days; the difficulty of breathing, at first often remitting, we apprehend must be referred partly to spasm, caused by inflammation of the membrane. In the progress of the disease, however, the dyspnœa becomes unremitting, which cannot be accounted for unless on the supposition of a permanent narrowing, the effect of œdema. If we had any certain means of ascertaining when the membrane is merely inflamed, and when it is œdematous as well as inflamed, much of the difficulty which attends the treatment of the disease would be removed.

Treatment.—But as we have no certain means of establishing the condition of the windpipe, we must be guided by the symptoms of the disease in deciding the question of bloodletting, which is one of the most difficult points in therapeutics. Although bloodletting may be expected to remove the inflammation of the mucous membrane, it cannot be expected to remove the effusion from the tissue beneath it: as well might we expect that bloodletting would remove phlegmon after matter is formed, as that it will remove laryngitis after œdema is established. It may prevent the further deposition of serum, and render it easier for the absorbents to act upon that which has been already effused; but more than this we are not to expect.

The practice of the physicians who attended the great American President during his last illness, was, we conceive, very unfairly decried by some of their professional brethren on this side of the Atlantic; and this is the more remarkable, as medical criticism was not so grossly vituperative thirty years ago as it is now. In a medical journal of 1800 we find the following specimen of gratuitous illiberality:—"Think of a man being, within the brief space of little more than twelve hours, deprived of eighty or perhaps ninety ounces of blood, after swallowing two moderate American doses of calomel, which were accompanied by an injection; then five grains of calomel, and five or six of emetic tartar; vapours of vinegar and water frequently inhaled; blisters applied to the extremities; a cataplasm of bran and vinegar to his throat, upon which a blister had been already fixed: is it surprising that, when thus treated, the afflicted general, after various ineffectual struggles for utterance, at length articulated a desire that he might be allowed to die without interruption! To have resisted the fatal operation of such Herculean remedies, one should imagine that this venerable old man ought at least to have retained the vigour of his earliest youth. A British physician may be deemed not competent to ascertain the propriety of transatlantic practice: the current of blood in the inhabitants of the new world may bear some proportion to the current of its rivers; in that case the medical treatment ought likewise to be conducted on a larger scale," &c. In answer to this rhapsody, in which the writer has tried to destroy the character of two respectable physicians, it may with truth be affirmed, that when these gentlemen pronounced the disease of which their illustrious patient died to be cynanche trachealis, they proved that they were not ignorant men. They showed that they were not ignorant of the seat and nature of the disease; they knew it to be seated in the upper part of the windpipe, and to be of an inflammatory nature. We venture to say that their critic would not have been nearer the mark. Perhaps there was not in Britain more than one individual, namely Monro, who was acquainted with the true nature of the disease of which General Washington died. The late Dr. Pitcairn, a physician in London, of deserved reputation and character, ten years after the death of General Washington, being attacked with the same disease, when no longer able to articulate, "wrote down with a pencil on a slip of paper that his complaint was to be considered as croup." Nay more; Dr. Pitcairn's case was the first which the late Dr. Baillie, then at the head of the medical profession in England, had ever witnessed; and that great physician, with his characteristic candour, admits that he was ignorant of the nature of the disease of which his friend Dr. Pitcairn was dying. Dr. Pitcairn, the day before he died, did not consider himself in danger, but thought that he was suffering under an attack of cynanche, such as he had often experienced, with a little more than its usual severity; and this, adds Dr. Baillie, was so much impressed on my mind, "that I did not even examine his throat, nor did he seem to wish it." Moreover, four hours before his death, when drowsiness was coming on, Dr. Baillie "thought him somewhat better." Hence it is probable that the best informed physicians in England, prior to the publication of Dr. Farre and Dr. Baillie's papers on cynanche laryngea, would have pronounced General Washington's case to be one of cynanche trachealis. This being admitted, the American physicians ought not to have been charged with ignorance, nor their practice so mercilessly impugned. What are the most approved remedies for croup? Bleeding, tartar-emetic, blisters, and, according to many, calomel: these were the remedies which General Washington's physicans prescribed, and which they administered, it must be admitted, with boldness. Whatever injury the patient sustained from the measures employed ought to be charged, not to the account of the intelligent physicians who attended him, but to the less perfect state of pathology at the end of the eighteenth century than at present.

General Washington died within twenty-four hours of the commencement of his illness; and we cannot deny that in this supposed case of croup, the remedies employed, however justifiable in the then state of medical information, probably shortened the general's life. If bleeding fails to subdue an inflammatory disease, it will be hurtful "by depressing the power by which the muscles act;" and on the vigorous action of the muscles which expand the chest, depends a continuance of that struggle by which the lungs are supplied with air sufficient for the arterialization of the blood.

We acquire a juster view of laryngitis by contrasting that disease with croup. They are both truly inflammatory diseases, but in that point alone do they resemble each other. Croup is a disease occurring before puberty, generally affecting, not merely the larynx, but the whole of the bronchial membrane, ending in an effusion of lymph on the free surface of the membrane, to be cured, probably, in ninety-nine cases of a hundred, by emetics and bleeding timely employed; and it is a disease in which a surgical operation will only add to the danger to which, in the second stage, the patient is exposed. Laryngitis, on the other hand, is a disease which rarely occurs before puberty; is confined to the upper extremity of the wind-pipe; ends in a serous effusion into the cellular tissue beneath the mucous membrane; will probably terminate unfavourably, in a great majority of cases, under any method of treatment; in which emetics aggravate the danger, and bleeding is often a doubtful remedy; and in which, when the patient is *in extremis*, bronchotomy will afford the only reasonable hope of safety.

Bloodletting has been successfully practised in this disease, as the reader may be convinced by several recorded cases: for example, by a case to be found in a paper on laryngitis, published by Dr. Beck, of New York, in the twelfth number of Dr. Beck's Journal. The case occurred in the person of Dr. Francis, one of the editors of the Journal, who, having for three days had soreness of the fauces and thirst, was attacked with pain, difficulty of breathing and swallowing, and a sense of strangulation, for which symptoms 152 ounces of blood were abstracted, as follows: On the 17th Nov., 1823, V. S. ad ℥xl.; evening, ℥xx. 18th Nov. ℥xvi.; evening, ℥xvi. 19th Nov. ℥xvi.;

evening, ℥xvi. 20th Nov. ℥xvi. 22d Nov. ℥xii.—Total, ℥clii. For three or four days after, the patient was still in a precarious condition, and required a repetition of the bloodletting. Other cases are published, in which the lancet was successfully employed: in one of these, to be found in the sixth volume of the Medico-Chirurgical Transactions, viz., that of Sir J. Macnamara Hayes, as reported by Dr. Roberts, of Bishop Stratford, we learn that the first bleeding "was attended with considerable relief," the second "with manifest advantage;" by the third, "his safety appeared to be ensured." In the case of a young woman who earned a pittance by gathering cockles on the strand at ebb-tide, and afterwards hawking them through the streets of Dublin, who, on the 13th of July, 1813, presented herself at the county of Dublin Infirmary, on the second day of laryngitis, pale, scarcely able to articulate or swallow: the effort producing a convulsion as when a crumb enters the wind-pipe, the voice sounding as if she were throttled,—inspiration being slower than natural and sibilous,—the following treatment proved successful. At noon, she was bled ad deliquium, which, by the way, had nearly proved fatal. The venesection was repeated twice in the course of the evening. On the following day, respiration was rendered difficult by the least exertion; hitherto unable to swallow. She was again bled, and a purgative enema and blister prescribed. Next day she began to expectorate yellow mucus, and could swallow fluids. On the 16th July, convalescent.

It is observable that the lividity of complexion which, especially in the more advanced stages of laryngitis, arises from imperfect arterialization of the blood, did not exist in any of these cases.

On the other hand, bloodletting has been unsuccessfully practised in laryngitis, not only in the case of General Washington, but also in many others. In the second attack of laryngitis, that to which Sir John Hayes fell a victim, he was three times bled from the arm on the second day of his illness; and the result of his case, and the other cases reported by Dr. Baillie, in which also bloodletting was practised, led Dr. Baillie to affirm that "venesection, even when employed strenuously and early, was of no real use." But the most remarkable instance of the inefficacy of bloodletting may be found in Dr. Armstrong's Practical Illustrations of Typhous Fever, p. 393. The loss of one hundred and sixty ounces of blood within six hours, gave temporary respite to the difficulty of breathing, yet was so far from arresting the inflammation, that death took place within twenty-four hours. As, then, there are cases in which bloodletting is salutary, and cases in which it is hurtful, let us try to ascertain when and to what extent that remedy ought to be practised; and let us be permitted to premise that cases will occur in which it may be difficult to come to a satisfactory conclusion with respect to bloodletting—in which the considerations for and against that remedy will be balanced, so as to make the most skilful and experienced physician pause. In such a dilemma, however, it will be well that the physician should not allow his doubts to transpire; as doubts which may be the result of an accurate weighing of indications against contra-indications, and which prove that he is a pathologist, will, perhaps, by the world and by his unreflecting brethren, be thought to proceed from inexperience and perplexity.

We conclude, first, that bloodletting will be more clearly indicated in youth than in age. It may be observed that the same means by which Sir John Hayes was relieved during his first attack, which took place in the meridian of life, failed fifteen years after:—and, secondly, that we may bleed with most hopes of success, when the symptoms of inflammatory fever are most evident. In Sir John Hayes, during the first attack, the face was swollen and flushed; the eyes were protruding and bloodshot; there was fulness about the neck, the muscles feeling very turgid, and the breast being suffused with a purplish colour; whereas, in the second attack, we find that his skin was not hot, nor his pulse more frequent than in health.

"At the beginning of the attack, it may be advisable," says Dr. Baillie, "to take as much blood at once as to produce fainting. We beg to submit to the reader, that blood in laryngitis is sometimes so imperfect a stimulus to the heart, that if the action of that organ is interrupted, it is not improbable that it will never be resumed. In certain conditions of the circulation in this disease, I have found bloodletting a very dangerous measure. I think it was fatal to a patient who came to the County of Dublin Infirmary about twenty years ago, when I was one of the physicians to that hospital. By my orders he was let blood, not till he fainted, but till he became pale and fainty; very shortly after the operation, which sensibly reduced his strength, he was seized, upon slightly exerting himself, with a paroxysm of difficult breathing, not more violent than many from which he had emerged, during the two or three previous days, and expired." In Dr. Beck's paper, already referred to, we learn that Dr. Hoffmann of the United States Navy was called to a patient in laryngitis whose countenance was anxious, flushed, and covered with sweat; eyes staring, and dyspnœa insufferable; that a vein was opened in each arm, which bled freely, and that death took place in a few minutes after. Mr. Porter, in the eleventh volume of the Medico-Chirurgical Transactions, after drawing a very lively and accurate portrait of laryngitis in a man about thirty years of age, who came to the Meath Hospital with his face pale and swollen, his lips livid, his mouth closed, his nostrils widely extended, his eyes protruded and starting from their sockets, but at the same time with the conjunctiva very white, and covered with a watery suffusion, and with an expression of indescribable anxiety; his pulse hurried, and his breathing very laborious, making two or three, or even more attempts at inspiration for one expiration, and his convulsive struggles for breath truly painful to behold, breathing with a hissing or whistling sound, while the utmost endeavour at speech was only an indistinct whisper;—tells us that he ordered from thirty to forty ounces of blood to be taken from both arms, and adds that in about two hours afterwards, when he returned to the hospital to perform bronchotomy, there was scarcely a pulse to be felt at the wrist; the extremities were cold; the patient lay on his back

almost insensible, and seemed sinking with amazing rapidity. Knowing the candour of the intelligent and skilful reporter of this case, we are not afraid to observe that this was a combination of symptoms in which bloodletting was not likely to improve the condition of the patient, for whose sufferings the proper remedy was the knife, which was afterwards successfully employed. Indeed, Mr. Porter, in his valuable remarks on the case, has affirmed that it presents a strong illustration of the inefficacy, in laryngitis, of bleeding, blisters, and the various internal means usually resorted to for the purpose of subduing inflammation. We conclude, that although we may bleed in certain states of the disease so as to influence the pulse, it would be unsafe under any circumstances to bleed usque ad deliquium.

The question of bleeding may with most safety be determined by the condition of the circulating fluid. We may, with comparative safety, bleed while the complexion is good, or, in other words, so long as the quantity of atmospheric air admitted into the lungs is sufficient to produce that chemical change by which venous blood, in passing from the right ventricle to the left auricle, is converted into arterial; but when the alteration in the appearance of the patient takes place remarked in the advanced stages of the disease, which indicates that the blood is no longer arterialized in its passage through the lungs; when the face and lips, especially the latter, become livid, the expression anxious, the eyes protruded and watery, and when these appearances are established permanently, we may conclude that the stricture of the glottis is of a nature not to be relieved by bloodletting, and if so, that the patient will be injured thereby.

In the early stages of laryngitis, would not the application of leeches to the palate and tonsils be deserving of a trial? This question the reader will be better able to answer after he shall have read a short but valuable paper by Surgeon General Crampton, in the third volume of the Dublin Hospital Reports, on the application of leeches to internal surfaces. Mr. Crampton informs us, that in no instance in which leeches have been applied to the tonsils within the first twelve hours of the attack of inflammation, has the disease proceeded to suppuration.

We would bleed the patient freely during the first twenty-four hours; we should be disposed to do more—so long as the complexion of the patient is good, we would have recourse to venesection, keeping a finger on the artery while the blood flows, and closing the orifice when the pulse is reduced: we would have leeches applied, or blood removed from the nucha by cupping; and should be disposed to bleed again, or even a third time, so as to abstract forty or fifty ounces of blood, and at the same time let the patient have a powder containing two or three grains of calomel, three or four of pulvis Jacobi veri, and one-half or one-third of a grain of opium, every third or fourth hour, till the gums become affected. This we prefer to an exhibition of tartar-emetic, not wishing to expose the patient to the danger of vomiting, which is productive of a frightful struggle in laryngitis. Blistering the neck is of very questionable efficacy, and by the inflammation, stiffness, and soreness which it occasions, adds much to the sufferings of the patient, and, when bronchotomy becomes necessary, to the inconveniences which attend that operation. If the physician reposes much confidence in the antiphlogistic power of a blister, let it be deferred till bleeding has been carried as far as is expedient, and then let it be applied to the upper part of the sternum.

"From bleeding and opiates," says Dr. Baillie, "if no substantial advantage is produced in thirty hours, it might be advisable to perform the operation of bronchotomy at the upper part of the trachea, just under the thyroid gland." We apprehend, however, that a consideration of the mere duration of the disease will lead us astray; thirty hours may be too long to wait, or it may be too short. If the circumstances of the patient, especially the condition of the circulating fluid, be such as to contra-indicate bleeding, and to show that asphyxia is imminent, it may be improper to put off the operation for thirty minutes. If the complexion is good, if asphyxia is not threatened, the operation may be delayed for thirty days.

In Dr. Baillie's second case already referred to, it is stated, "in the night time, the patient becoming much worse, Mr. Tegart, who scarcely ever left him night or day, went for Mr. Home and Mr. Wilson to perform the operation of bronchotomy. Mr. Wilson was out of town on professional business, but Mr. Home came about four in the morning. The patient, however, was beginning to sink, so that no advantage from an operation was now to be expected." It is, indeed, probable that bronchotomy would not have saved the patient; but as that operation in an adult can be performed without difficulty, and as there are instances of its having been successful even when the brain was oppressed, which is the most alarming symptom in this disease, we humbly think that no patient who is not in the article of death ought to be deprived of the chance of escape which it affords. The patient operated upon by Mr. Goodeve, surgeon to the Clifton Dispensary, was quite insensible when the operation was performed; "no pulse could be found at the wrist, his face was suffused with blood and his lips livid, and it was hard to say whether he breathed or not," and yet he recovered.

There can be little doubt but that in most cases the aperture ought to be made between the thyroid and cricoid cartilages, but in this matter the surgeon must be the arbiter.* The operation has

* On this subject consult Mr. Lawrence's paper in the sixth vol. of the Medico-Chirurgical Transactions.

The writer of this article many years ago recommended the introduction of a trocar and cannula, without previous incision. This operation is justly condemned by Mr. Wood in his valuable paper published in the seventeenth vol. of the Medico-Chirurgical Transactions. Mr. Wood observes: "Dr. Cheyne has advocated an operation equally reprehensible with that of Dessault, who recommended the introduction of an elastic tube through the nostril into the trachea, *that of introducing into the trachea a trocar and canula without previous incision.* The reflection that the canula must irritate by being moved up and down with the larynx, which does not move in association with the skin, combined with the danger of wounding a large blood-vessel irregular in its course, the œsophagus and contiguous important parts, and the depth it may be necessary to penetrate in consequence of the unusual depth of the trachea from the surface, ought to preclude this use of the trocar," &c. This quotation is introduced as an *amende* for the inconsideration that led to the proposal of an operation which is so objectionable.

often proved perfectly successful, and a canula has been worn for a long time without much inconvenience. Thus the patient operated upon by Mr. Goodeve wore a tube for more than six months; he was then able to lay it aside, and his voice was quite restored. In the fourth volume of the Dublin Hospital Reports, we learn from Mr. White that one of his patients was wearing a tube without being prevented from working at his trade, which was that of a cabinet-maker, two years after the operation; the sides of the opening, which was of an oval shape, and one inch in depth to the trachea, being perfectly healed, smooth, and covered with a thin cuticle. But the most remarkable proof of the relief which the canula is capable of affording, is that which is supplied by the case of Mr. Price of Portsmouth; we learn in the twenty-ninth number of the Medico-Chirurgical Review, in which journal there is much valuable information to be found on laryngitis, that Mr. Price had been breathing for about fifteen years through a canula.

Laryngitis sometimes is more of a chronic than acute affection, in which case the affected organ probably undergoes a considerable change of structure; in the case in Mr. Lawrence's paper, which we have already alluded to, which continued for nearly four months, the mucous membrane had assumed a thick and puckered condition, and had partially thrown out coagulable lymph of a stringy and fimbriated texture, which obliterated the ventricles of the larynx. In one of our cases which had lasted four months, the membrane lining the glottis, and arytenoid cartilage, was like a thin layer of flexible cartilage. In chronic laryngitis, *mutatis mutandis*, the same principles of treatment are applicable as in the acute species. Bronchotomy may be necessary to prevent that fatal exhaustion arising from continued disturbance of the respiratory function, as it was in the case related by Dr. M. Hall in the tenth volume of the Medico-Chirurgical Transactions; but medical means alone will often prove sufficient for the removal of the inflammation, if it be unaccompanied with ulceration. The remedies chiefly to be relied on in chronic succeeding acute laryngitis, are, change of air—this remedy we again specify, even at the risk of being thought to harp a little too much upon one string; — the establishment of a discharge from both sides of the larynx by means of small caustic issues; and mild mercurials, with the infusum sarsaparillæ compositum of the Dublin pharmacopœia.

J. Cheyne.

[*Chronic Laryngitis* has received more attention of late years than formerly, and will, therefore, require further consideration. This term has been employed synonymously with *Laryngeal phthisis*, *Phthisis laryngea*; whilst laryngeal phthisis itself has been employed by MM. Trousseau and Belloq, so as to comprise "any chronic alteration of the larynx, which may bring on consumption or death in any way." It has been used, indeed, to include all chronic diseases of the larynx. In this place, the epithet "chronic" is employed in regard to laryngitis, in the same manner in which it is applied to other inflammations of mucous membranes:—to signify inflammation of the lining membrane of the larynx, or of the subjacent parts, the duration of which is long, or whose symptoms proceed slowly.

Diagnosis.—The commencement of chronic inflammation of the various structures composing the larynx is often extremely insidious, and its progress so tardy, that much, and often irreparable mischief is accomplished before any alarm is taken by the patient, and he applies for medical assistance. Pain is felt in the larynx, but its precise situation may vary; at times, it extends over the larynx; but, at others, is restricted to a small space, and generally to the region of the thyroid cartilage. Commonly, a kind of tickling sensation exists, which provokes coughing. The pain, too, is exasperated by coughing, speaking, and deglutition, especially when ulcerations exist, and they are situate above the ventricles of the larynx. The breathing of cold air, and pressure upon the larynx likewise augment it. The voice is almost always changed, being hoarse, and, at times, so much enfeebled, as to be inaudible. The aphonia may supervene suddenly or gradually, and ultimately be complete. Cough is a constant concomitant, and when the mucous membrane is much swollen, it becomes hoarse and even croupy. In the first instance it is dry, but subsequently it is accompanied with the expectoration of mucus, mixed occasionally with pus or blood. At other times, a membraniform matter is expectorated for months; and at others a considerable quantity of false membrane is thrown off, after which the patient rapidly recovers. Occasionally, portions of cartilage are mixed with the mucous or bloody sputa, and in such cases, there is always accompanying hectic. Chronic laryngitis has, indeed, been divided into two heads;—the first comprising that which affects the mucous membrane and the submucous tissue; and the second, that which implicates the cartilages; the latter—it has been conceived—having perhaps the best claim to the name *phthisis laryngea*, from the incurable nature of the affection, and the hectic and emaciation, which invariably accompany its latter stages.

When chronic laryngitis is slight, and there is not much narrowness, the difficulty of breathing may not be great; but if it be attended with much tumefaction of the lining membrane, the dyspnœa is considerable, and the sound, on inspiration, sonorous and peculiar. It is evidently, too, augmented by paroxysms. The air of inspiration likewise gives rise to a snoring (*ronflement*) or whistling, (*sifflement*,) which may be continuous, or recur in paroxysms. These local symptoms may be so slight, that the general health does not suffer to any great degree. Commonly, however, more or less sympathetic febrile disorder is apparent, under which nutrition is impaired, and atrophy supervenes. The disease now merits the term *Laryngeal Phthisis*, which is, however, in the immense majority of cases, connected with the presence of pulmonary tubercles.

Chronic laryngitis may be primary, or it may succeed to acute laryngitis, and when apparently terminating in health, it is readily reproduced by exposure to cold, errors in diet, &c. &c. Its duration varies from a few months to several years.

When the fauces are inspected, but little evidence of disease may be perceptible; at other

times, however, the mucous membrane is injected, and the follicles are so large as to resemble split peas. Whether this enlargement of the follicles be the cause or effect, may admit of a question. The enlarged follicles probably exist lower down, where they cannot be inspected. This form of laryngitis is the one often known under the name "*Clergymen's sore throat.*"

Chronic laryngitis may terminate in health; but it is more likely to end fatally; and this may occur in different modes,—either by the lungs becoming implicated, or by the extent of the laryngeal lesions themselves, which may excite severe irritative fever, or interfere with the entrance of air into the lungs, and thus induce asphyxia. In almost all cases of phthisis laryngea, the disease is complicated with pulmonary tubercle. Dr. Stokes, indeed, asserts, (*On Diseases of the Chest*, Amer. edit., Philad. 1844,) that after ten years of hospital and private practice, he never saw a case presenting the symptoms of laryngeal cough, purulent or mucopurulent expectoration, semi-stridulous breathing, hoarseness, or aphouia, hectic, and emaciation, in which the patient did not die with cavities in his lungs. In some, the laryngeal affection seemed to be primary; but, in the great majority, symptoms of pulmonary disease existed previous to its appearance. Such, also, is the result of the writer's observation.

In many cases of pulmonary phthisis, — sore throat, hoarseness, or aphonia, with cough, occur; but the case is different, when the laryngeal symptoms have been primary.

Causes.—The same causes, that give rise to acute laryngitis, may induce the chronic form also. It may be caused, like the acute, by the inspiration of acrid substances, or by extraneous bodies received into the larynx. The habitual and intemperate use of ardent spirits has likewise been esteemed a cause, as well as the effects of mercury. These act either as predisposing or exciting causes. It is often the result of phthisis pulmonalis; whilst, on the other hand, the pulmonary irritation, induced by it, may occasion the development, and augment the course of tuberculosis of the lungs in those who are predisposed to pulmonary consumption. The coexistence of ulceration of the lungs, and of suppurated pulmonary tubercles, has often been proved. In one-fourth of the cases of phthisis, ulceration of the larynx has been observed; in one-sixth, ulceration of the epiglottis; and ulceration of the trachea was met with by M. Louis, more frequently than either of the other lesions. (On *Phthisis*, 2d edit., translated by Dr. Walshe —Sydenham Society edit. Lond. 1844.) It is probable, however, that the idiopathic chronic laryngitis rarely produces the symptoms of phthisis; but the two diseases are frequent concomitants.

Amongst the exciting causes are mentioned—prolonged action of the vocal organs; hence the disease is said to be frequent among actors, singers, lawyers, preachers, &c. It has already been remarked, that it is so common among the last as to have received the name of the *clergymen's sore throat;* yet why it should prevail among them more than among lawyers, professors, &c., who use their vocal organs more, is not so clear. It has, indeed, been suggested, by Professor Chapman of Philadelphia, that clergymen, as a class, are of feebler constitutions, which circumstance may have originally led them to embrace their avocation; and, hence, that they are more liable to such derangements than more healthy individuals; but this does not seem sufficient to account for the difference. Another explanation has been offered by Dr. Stokes—(*Op. cit.*) that the clergyman begins to exercise his vocal organs at a much earlier period than the lawyer, for example. The young clergyman, often of a feeble and nervous constitution, and acting under conscientious motives, to the neglect of bodily health, not only reads the service, and preaches once or twice, or even more frequently in the week, but is exposed to night air and the inclemency of the weather. He is compelled to do so, while both the larynx and constitution of the lawyer have generally full time for maturity, before he need employ the one or expend the other in the duties of his profession.

Syphilis would appear to be a frequent cause of chronic laryngitis, and especially of the ulcerative form,—the ulcers extending, at times, from the throat by continuity of surface.

As to age, the disease has certainly been observed most commonly between twenty and forty; but, as to sex, discrepancy of sentiment exists;—some, as Ryland, (*On the Diseases and Injuries of the Larynx and Trachea*, Amer. Med. Lib. edit. Philad. 1838,) affirming, that the number of females, attacked by it, is infinitely greater than that of males; others, as Andral, (*Cours de Pathologie Interne*,) that males are more frequently affected than females.

Pathological Characters.—Chronic inflammation induces the same changes in the laryngeal mucous membrane as in other membranes of the class; for example, redness, increased thickness, and alteration of consistency, over a greater or less extent of surface. Occasionally, too, vegetations of considerable size, and white and hard granulations are perceptible. Pus, too, is generally found covering its surface. The mucous follicles, both of the lining membrane of the pharynx and larynx, are frequently enlarged, especially in that form of the disease to which clergymen are subject, and they seem filled with a yellowish matter. Ulcerations are likewise very common, so as even to destroy the vocal cords. The submucous cellular tissue is often infiltrated by a thin fluid; and, at times, collections of pus exist in it; at others, it is indurated, and tubercles are found in different stages of development. The intrinsic muscles of the larynx have been found much reduced in size, softened and occasionally destroyed. At other times, they have been hypertrophied. The epiglottis may be thickened, ulcerated, carious, and even completely destroyed; yet the patient may have been able to swallow to the last. Of the cartilages of the larynx, the cricoid and the arytenoid are most frequently diseased—the thyroid least so. Occasionally, they are ossified, or ossific points are deposited on the mucous membrane. In broken down constitutions, in which large quantities of mercury have been used, it has been remarked, by Drs. Graves and Stokes, that chronic laryngitis is very apt to terminate in ulceration of the cartilages.

Treatment.—In the treatment of chronic laryngitis, at all stages, rest of the vocal organs is

indispensable; but it is difficult to have it rigorously enforced. In the early periods, bloodletting from the arm is sometimes demanded, and in almost every case, it will be advisable to apply cups to the nape of the neck, or top of the chest; or, what is better, leeches freely over the seat of the disease. Emollient fomentations and poultices, likewise afford relief, but they have been objected to—probably altogether on hypothetical considerations—under the idea that they solicit an increased flow of blood towards the throat, and thus aggravate the disease. Revellents are, certainly, important remedies. A blister may be applied to the top of the sternum, or over the trachea, and as soon as it heals, another should be applied, so as to keep up an intermittent, which is preferable to a permanent, irritation. Hence blisters, thus employed, are better than setons; and the ointment of the tartrate of antimony and potassa, or the croton oil, is, perhaps, preferable to either.

With the view of procuring rest, opium and its preparations may be given. They are useful, likewise, in allaying cough. The salts of morphia may also be employed endermically, and advantage has been derived from frictions over the larynx, with the extract of belladonna.

Where the affection of the larynx has lost its inflammatory characters, and any of its terminations remain, topical remedies may be employed. These have, indeed, been regarded by MM. Trousseau and Belloq (*Practical Treatise on Laryngeal Phthisis*, translated by Dr. Warder, Amer. Med. Lib. Edit. Philad. 1838) as the most efficacious of all. They may be made to come into immediate contact with the diseased surface itself. At an early period of the disease, inhalations of the steam of warm water may be employed with advantage, but subsequently more excitant applications are needed, to induce a new action in the diseased surface. Inhalations, however, are liable to the inconvenience, that they cannot be restricted to the larynx; and, consequently, no agents are administered, in this manner, in cases of chronic laryngitis, except such as do not over-excite the mucous membrane of the lungs. The vapour of hot water, to which one of the essential oils has been added, may be used in the way of inhalation, with safety and occasional benefit. Various forms of apparatus have been devised for this purpose; but MM. Trousseau and Belloq frankly confess, that a simple teapot is as well adapted to the purpose as the most complicated machines. In this way, chlorine, creasote, and iodine, may be inhaled under the circumstances laid down under Tubercular Phthisis.

Topical remedies in solution are more to be relied on. Of these, nitrate of silver, corrosive sublimate, sulphate of copper, nitrate of mercury, and Lugol's caustic solution of iodine, (see the writer's *New Remedies*, 4th edition, Philad. 1843,) have been employed; but the nitrate of silver is to be preferred, on account of its rapidity of action and harmlessness. It may be used in the proportion of ten or fifteen grains to the ounce of water, and it has been prescribed as strong as one part of the nitrate to two parts of water. Various plans have been adopted for applying it. The author uses a mop of rag at the extremity of a piece of whalebone. Others attach a piece of sponge to the end of a quill, dip it in the solution, and having slightly squeezed it to prevent the fluid from dropping, they touch the posterior fauces; raise the outer extremity of the quill so that the sponge may touch the epiglottis and superior part of the larynx, and draw it gently out in this manner. Thus, the solution is made to come into immediate contact with the inflamed surface. By others, it has been advised to take up a drop of the strong solution on the bent extremity of a piece of firmly rolled paper, or whalebone, and to cause this to touch the lining membrane of the larynx. It has been suggested, that the solution may be thrown, in the form of a shower, into the larynx, from a small silver syringe, like Anel's; but the plans, already recommended, have the merit of being more easy of application.

A plan—before mentioned—proposed by Mr. Cusack, of Dublin, has been regarded by a competent witness, Dr. Stokes, (*Op. cit.*) as the best of all. A brush of lint, of the requisite size, is sewed on the end of the finger of a glove, which is then drawn on the index finger of the right hand. The patient is made to gargle with warm water, and the lint being dipped in the solution, can be readily applied to the larynx.

When the disease is dependent upon any syphilitic *vice*, it may be necessary to administer mercury, or some other revulsive agent—iodine, for example. When mercury is pushed so as to affect the mouth, it sometimes breaks in upon the morbid chain where no *vice* is suspected or present. It should be given, under such circumstances, so as to exert its ordinary influence slightly on the mouth. When, however, pulmonary tubercles are coexistent, care must be taken in the administration of this potent remedy, as the dyscrasy, induced by it, is apt to cause their development. Where the disease is dependent upon the use of mercury, it should, of course, be carefully abstained from, and an appropriate treatment, in which rest and the free use of iodine are combined, should be prescribed.

In many cases, the spasmodic exacerbations are very severe and distressing: they may be assuaged by opiates, or by the application of the *emplastrum belladonnæ* or *emplastrum opii*.

Lastly,—a question may arise as to the necessity for the operation of tracheotomy. Although frequently demanded in acute laryngitis, and not to be postponed, it is rarely necessary in cases of chronic laryngitis; but should symptoms, similar to those of acute laryngitis, which demand the operation, arise, it must be unhesitatingly performed. It is probable, however, that in such a case, the operation could be of but transient benefit; so much disorganization must have occurred as to render ultimate recovery almost wholly, if not wholly hopeless. Robley Dunglison.]

LATENT DISEASES.—It is a fact familiar to every physician practically conversant with the features of disease, that many disorders, even those of which the presence is commonly indicated by well-marked symptoms, will in particular cases present, throughout the whole or a great part of their course, a material deficiency or total absence of their usual external characters; and that on this account they are frequently on the one hand

confounded with other diseases, on the other entirely concealed from observation.

Considering the obvious importance of this subject in a practical point of view—especially, it may be added, to those just entering on their profession,—it scarcely seems to have hitherto received from pathological authors in modern times that systematic attention to which it has an undoubted claim. In ordinary practice every observant physician is subject to be taken at unawares by the sudden transformation or sudden development of the symptoms of diseased action, long latent in the system, and secretly advanced beyond the reach of a remedy. And in the practice of one particular branch of his art, that of medical jurisprudence, nothing is more common than to find his opinion and conduct embarrassed by sudden death arising in the like circumstances —by the discovery of appearances in the dead body adequate apparently to account for death, yet unconnected with any traces of the existence of corresponding disease during life. It would be an object of some consequence then to investigate the subject of latent diseases systematically in both of its relations now mentioned, — to present a classification of the several diseases which are apt to assume a latent course, a sketch of the circumstances in which they are liable to occur in this form, and an exposition of the phenomena in the living body which may lead to a suspicion or conviction of their presence, as well as a statement of the evidence by which, in the case of the sudden extinction of life, we may determine from the appearances in the dead body, taken along with other collateral considerations, what has been the real cause of death.

The great extent of the subject, combined with other circumstances, prevents us from undertaking at present what must be to the generality of the profession the more important and interesting department of this inquiry, — that, namely, which concerns latent diseases in their relations to ordinary practice. In undertaking to give some account of their medico-legal relations, it is almost unnecessary to observe, that the writer was first led to review the subject in consequence of its having been often brought forcibly under his attention during a period when he was frequently consulted in medico-legal cases, and that the hints which follow are chiefly derived from a consideration of what then appeared defective in our knowledge.

The importance of latent diseases in respect to medical jurisprudence depends on the consideration that sudden death, as one of their results, often leads to a judicial inquiry into its cause, even where no suspicions exist in regard to its manner; that sudden death from latent diseases frequently occurs where collateral circumstances lead to a suspicion of violence; that they are apt to prove suddenly fatal from the operation of slight violence or of circumstances incidental to violence, such as anger, struggling, or the like; and that the appearances they leave in the dead body may exist in the same organs, or even also present the same characters, with the appearances occasioned by death from violence of various kinds. On all these accounts latent diseases come frequently before the physician in his medico-legal capacity, and may give rise to medico-legal questions of much nicety. The remarks which follow are intended to exemplify what is now stated, and to supply as far as possible the means of investigating the cases here alluded to. These objects will be best attained by considering, first, what diseases are apt to put on a latent character and occasion sudden death; and next, by what means it may be proved in special cases that they have really been the occasion of death.

There are many diseases which may exist for a long time, and even advance so far as to cause decided injury to organs important to life, without seriously incommoding the patient and without occasioning death. Nay, there are many diseases, among those usually marked by prominent symptoms throughout, which may go on for a length of time and occasion most extensive organic derangement, without attracting the attention of the patient or his friends by any external sign, without producing ill health of any kind, and still more without being the occasion of death. In many such instances indeed the symptoms proper to the disease are incidentally developed after a time, and then follow their usual course to a favourable or unfavourable termination. But often, too, no such development takes place, and death may ensue suddenly, nay instantaneously, either from the disease attaining a certain point incompatible with the further continuance of life, or from some circumstances connected with it of which the operation cannot be satisfactorily traced: and, which is perhaps still more common, death may be occasioned by some other unconnected cause, and the first hint of the existence of latent disease is the discovery in the dead body of extensive alterations of structure, such as might be regarded, were it not for such occurrences, wholly inconsistent with the discharge of the most important vital functions.

It would not be easy to give a complete catalogue of the diseases which may thus run a latent course. Probably, indeed, such a catalogue would be found to comprise all or nearly all the diseases which give rise to important derangements of structure in the chief internal organs of the body. But it may be of use to indicate those which are most apt to assume the latent form, because such alone appear of material consequence to the practitioner.

Among the diseases of the head, those which are chiefly apt to present themselves in a latent form are sanguineous apoplexy, inflammation of the cerebral membranes, and inflammation of the substance of the brain.

Sanguineous Apoplexy often runs its course so rapidly, although with distinct symptoms, that in reference to practical questions of a medico-legal nature, it presents all the peculiarities and all the importance of a truly latent disease; but it would be out of place to treat of it in that respect at present. In numerous instances, however, sanguineous effusion within the head may take place without occasioning the usual apoplectic symptoms, and the individual may live so long that complete recovery takes place by organization and absorption of the clot, or he may be cut off at an earlier period by some other cause. The proof of this is, that clots both old and recent are

not uncommonly found within the head, and more especially in the substance of the brain, where the individual was cut off by a wholly different disease, and where there was sufficient evidence that symptoms of an apoplectic nature never had presented themselves. In a case therefore where the manner of death is doubtful, and a medico-legal examination becomes necessary, it is not enough to account for death that a clot be found in the brain, particularly if it be plainly of some standing. Further evidence may be necessary to connect this appearance with the death of the individual.

It is seldom that **inflammation of the membranes of the brain** assumes a latent form throughout its whole course, yet in some instances the symptoms are extremely obscure for a time, so that the nature of the disease is at first misunderstood; and occasionally it has happened that no well-marked indications of disease are developed till a short time before death, and even then the symptoms are merely such as may terminate organic affections of the head in general,—namely, stupor, coma, and convulsions. One distinct case in point has been related by the writer elsewhere, that of a middle-aged female, who died suddenly from chronic and circumscribed inflammation of the membranes of the brain. In this case the membranes and also a part of the brain were covered with pus, the corresponding portions of the temporal and occipal bones were denuded and similarly lined with purulent matter, and a portion had even escaped into the cavity of the ear. This affection had commenced in the bones at least a twelvemonth before, because the patient had been affected for that time with a purulent discharge from the ear. There can be no doubt, too, that the inflammation of the membranes which was the immediate occasion of death, and was produced by the disease of the bone being propagated inwards, must have existed for a considerable length of time, yet no symptom of its existence was detected till she was suddenly seized with acute pain in the head, and then with stupor and convulsions, under which symptoms she died within twenty hours. A case somewhat like this, but where the meningeal inflammation was more extensive, has been related by Dr. Powell, in the fifth volume of the Transactions of the London College of Physicians.

But even meningitis of a more diffused character, and commencing without previous disease in adjacent parts, may likewise put on this singular form, as will appear from the following remarkable case related by Dr. Crispin, in the "Annali Univ. di Medicina." A stout healthy young woman complained for two days of slight headach, without any other indication either of disorder within the head or of any other affection, and was then quite suddenly seized with loss of speech, complete coma, and febrile reaction, under which symptoms she died in the course of the ensuing night. On dissection, there was found suppuration of the arachnoid membrane, while all the other parts of the brain and its membranes, as well as all the other organs of the body, were in the healthy state. (Prospetto Clinico, in Annali, &c. Maggio, 1833.)

It is not improbable that to the same head of latent chronic meningitis should be referred those remarkable cases where extensive serous effusion over the brain or within the ventricles has been found after death in persons either dying suddenly without any pre-existing symptoms, or expiring slowly under symptoms wholly unconnected with the morbid appearances. Dr. Abercrombie relates an instance of the latter description from the experience of Professor Turner of Edinburgh, where serosity was extensively effused under the membranes of the brain as well as in the ventricles, and where the patient presented no signs of an affection of the head, but appeared to be gradually worn out by some chronic disorder of the pelvic viscera, which, however, were found to be healthy. (On Diseases of the Brain, p. 214, third edition.) The same author mentions two similar cases from the works of Morgagni and Heberden, in one of which the effused fluid amounted to eight ounces, without any corresponding symptom during life. (Ibid. p. 143.) Perhaps the following extraordinary instance may be classed with the foregoing. But whether it be viewed as an example of latent meningitis or not, it is well worthy of notice as an illustration of the great difficulty which the occasional occurrence of cases of an allied nature may introduce into medico-legal inquiries, and of the importance of the whole subject of latent diseases. A man of the name of Kennoway was tried in Edinburgh, in 1825, for parricide, under the following circumstances. His sister left him in a state of furious intoxication, quarrelling and struggling with his father, an old man of seventy, of passionate disposition, but enjoying good health. On his quitting the house she returned—not above seven minutes after she left them together—when she found the old man lying dead on his back, with the marks of two blows on the nose and forehead, not particularly severe. On dissection there was found no fracture of the bone, no extravasation beneath it, no laceration of the brain, but an effusion of half a pint of reddish serum in the ventricles, and also towards a pint of serum in the cavity of the pleura on each side of the chest. This case presented several other features of interest foreign to the object for which it is now referred to. At present it may be observed, that the medical gentlemen who conducted the examination ascribed death to the effusion in the ventricles, and the effusion to the blow. But it is quite clear that the latter statement is untenable—that the effusion must have taken a much longer time to collect than seven minutes, and the most rational view of the case seems to be, that the effusion was the result of latent chronic meningitis.

Among diseases which leave their traces within the head, none is more subject to assume a latent form than **inflammation of the cerebral substance.** From numerous cases which have been related by various authors, it follows that in its chronic form inflammation of the cerebral tissue—that form of disease which is now familiarly known to terminate in suppuration or in softening of the brain—is seldom marked at the beginning by characteristic symptoms; that it often advances to a great height with scarcely any apparent

signs of its existence, or even of ill health of any kind, till only a few days before death; and that not unfrequently it even proves suddenly or almost instantaneously fatal during a state of apparently perfect health. The following illustrations have been already given by the writer in another work, but may be here briefly recapitulated. In a case related by M. Louis, where death slowly terminated an attack of diseased heart, and where no symptoms of an affection of the head occurred at any time, an extensive softening was found in the thalamus and corpus striatum of one side. (Recherches Anat. Pathol. 313.) In another, mentioned by Lancisi, where slight occasional fits of lethargy succeeded an attack of apoplexy, death occurred suddenly more than a year afterwards, and an extensive suppuration of the brain was found surrounding a clot. (De Mort. Subit. p. 12.) In another, which occurred to the writer himself, and which from its circumstances led to a medico-legal investigation, a twelve hours' illness consisting of coma and convulsions preceded death, and there was found superficial circumscribed ulceration of the anterior lobe of the brain. In another, which likewise occurred in the practice of the writer, a similar superficial softening and ulceration of the surface of the brain over the left orbit was found, although the patient had been affected with coma for an hour and a half only, and had previously enjoyed good health. (Treatise on Poisons, 574.) Lastly, in a remarkable instance described in the London Medical Repository, where death took place instantaneously, without any precursory illness at all, while the individual, a sailor, was pulling an oar, there was discovered on dissection in the central parts of the brain an extensive softening and suppuration, which in the form of an abscess had made its way to the outer surface of the organ. (Vol. ii. 318. N. S.)

Diseases of the chest run an obscure or completely latent course much more frequently than diseases of the head, and among these the most remarkable are pleurisy, peripneumony, and organic diseases of the heart.

As to **pleurisy**, it is remarked that sometimes the early, and at other times the middle stage is latent. There are either no symptoms at all, or they are so slight as to escape notice; or, though obvious at first, they disappear afterwards, and seem to be succeeded by convalescence or even complete re-establishment of health. Lymph and serum, however, or sometimes purulent matter, have in the mean time been effused into the cavity of the chest, and the effusion goes on silently increasing till one side of the chest is completely filled, and the corresponding lung compressed and unserviceable. And at length, occasionally after a long interval, the individual is seized with laborious breathing, and dies in a few days or hours, or even instantaneously.

An instance where the interval of obvious illness lasted for a few days, occurred in Edinburgh in January, 1826, and led to a medico-legal investigation, in consequence of the patient's friends having neglected to obtain medical advice, and refused information to the neighbours who afterwards inquired into the case. The symptoms were difficult breathing, cough and pain of chest, slight at first and severe only for a short time before death, which took place in the course of the third day. On dissection one side of the chest was found filled with serous fluid, together with evident collateral signs of the effusion having been of old standing; and it was ascertained that several months before, recovery had to all appearance been attained from a severe attack of pleurisy and consequent hydrothorax. A more remarkable instance, where the pectoral symptoms subsisted for a few hours only, is related in Corvisart's Journal. In this case the patient, who was convalescent from an attack of simple fever, was suddenly taken ill with great oppression in the chest, and died within twenty-four hours, and the left side of the chest was found filled with five pints of serum, and the heart covered with a net-work of lymph, evidently showing the existence of an old pleuro-pericarditis. (Journ. de Méd. xxviii. 100.) But the most common cases of the kind under consideration are where the disease is concealed throughout its whole progress, or becomes so after a time, and death takes place instantaneously. Of such a course the following are apt illustrations. A girl in the wards of the Edinburgh Infirmary, under the writer's care, while convalescent apparently from nothing more than a mild attack of simple fever with insignificant pectoral symptoms, suddenly dropped down dead while sitting by the fire and laughing with her fellow-convalescents, and on dissection there was found a copious effusion of serum and lymph into the right side of the chest, with complete condensation of the right lung. An elderly man under the care of another physician of the same hospital was admitted in the agony of suffocation from hydrothorax consequent on pleurisy, but recovered apparently, and in six weeks was considered nearly fit for being discharged. But one morning, while in the act of making his bed and exerting himself with unusual force, he was seen to drop down on the floor, and the nurse running up to him, found him quite dead. Five pints of serum were found in the right side of the chest, and no other morbid appearance could be discovered.

Peripneumony is similarly circumstanced. It is a matter of daily observation, as Laennec has pointed out, that very great differences prevail in different cases in the amount of organic alteration which takes place in ordinary cases of inflammation of the lungs, before death ensues from oppression of the breathing. It follows that, even in acute inflammation, the function of the lungs may be much interfered with by the inflammatory process, without necessarily endangering life. It is not surprising, then, that where the local inflammation is chronic, and the constitutional derangement slight or wholly absent, very extensive ravages may be committed by the disease without its giving any local sign of its presence. Many cases might be quoted in illustration of the fact that chronic peripneumony may advance till it completely obstructs a whole lung, without any sign of oppression of the functions of the lungs; and in such cases death may occur suddenly, without any fresh cause appearing to act, or it may be occasioned by some other disease or agent of a different kind, such as violence. The following are examples.

A man, who, with the exception of a slight cough, enjoyed excellent health, died suddenly one night, while making a slight effort; and one lung was found wholly disorganized and formed into a sac of purulent matter, which had burst into the general cavity of the pleura. (Dict. des Sc. Méd. art. *Mort Subite.*) Wildberg relates a similar case, which is very striking on account of the circumstances in which it proved fatal. A woman having charged a neighbour with having pilfered herbs in her garden, an altercation ensued, which was brought to a close by the neighbour seizing her by the arms, shaking her violently, and shoving her away. She fell down, and in fifteen minutes expired. On opening the body it was found that a large vomica of the left lung had burst into that side of the pleura, and filled it with four pounds of bloody pus. (Prakt. Handbuch für Physiker, iii. 255.) It was ascertained that the woman had an attack of peripneumony a year before; but from that time enjoyed good health, except that she complained of trivial cough, and some tightness in the chest. Two similar cases are related in Sedillot's Journal by a French physician, M. Mouton. One was the case of a custom-house officer, who died almost instantly after making a sudden effort in getting on board a vessel; the other was that of a sailor-lad who was found dead in bed, having retired in good health the previous evening. In the former, the right lung was one entire mass of suppuration; in the latter it was almost entirely in a state of carnification. In referring these cases to peripneumony, it must at the same time be admitted that several of them may be conceived to be instances rather of chronic pleurisy and empyema, having occurred before the late improvements in the pathology of diseases of the chest had led to a more accurate diagnosis of them.

Of all the diseases, however, which are the subject of the present sketch, none are of such frequent occurrence as **organic diseases of the heart.** Diseases of the heart often exist for a long time without a single symptom to attract the attention of the patient or his friends, and often prove instantly fatal without a single precursory warning. Nothing can exceed the irregularity of the circumstances in which such diseases prove fatal. Not only may one man sustain, without inconvenience, an amount of organic injury which cuts short the life of another; not only may one suffer long and cruelly from the same affection in kind as well as degree, which kills another without a moment's previous suffering; but likewise one person may die of a limited extent or degree of a disorder which, in another, reaches an extraordinary height without giving a single indication of its presence. It is almost unnecessary to illustrate by examples statements so familiar to all practitioners. But as they are nevertheless apt to escape attention in medico-legal investigations, a few instances will be subsequently mentioned, which will at the same time place in a clear light the importance of the present description of diseases in the practice of medical jurisprudence. Meanwhile it may be mentioned that, as sudden death from latent organic affections of the heart is the most common of all the varieties of sudden death from latent diseases, so is it medico-legally the most interesting and the most important.

It would not, at first view, appear probable that **pneumothorax** ought also to be enumerated among diseases of the chest which may put on a latent course, and prove suddenly fatal. In the most frequent variety of it, which is occasioned by a softened tubercle opening a passage into a bronchial tube on the one hand, and through the pleura into the cavity of that membrane on the other, the progress of matters is usually marked both by the antecedent symptoms of tubercles in the lungs, and by dyspnœa and other symptoms which succeed the passage of air into the cavity, and precede the fatal termination for a considerable interval of time. But at times the antecedent symptoms of tubercles are obscure or wholly absent, and death takes place suddenly at the moment of rupture of the pleura and passage of air into its sac. The following interesting case, which occurred in 1831, in the clinical wards of the Edinburgh Infirmary, under the care of Dr. Graham, establishes the statement now made. An elderly man had been six weeks ill, and during four of these in the hospital, on account of a dyspeptic complaint, and never presented any symptom to draw attention towards the chest as the seat of disease. At length he suddenly complained of an uneasy feeling in the pit of the stomach, and expired at once. The left lung was all studded with tubercles, so as to be almost impervious throughout to the air, and consequently unserviceable in the function of respiration; the right side of the chest was filled with air, so that the right lung, itself not very materially tuberculated, was compressed, and thus rendered unserviceable also; and the air had obviously issued from a recent ulcerated opening in the lower lobe, establishing a communication between the sac of the pleura and a considerable bronchial tube. The cause of the man's sudden death was here quite obvious; and the whole circumstances of the case prove how pneumothorax may be the occasion of instantaneous death, where no reason existed for suspecting the presence of any of the pathological conditions in which it is known to originate.

This case leads to the observation, that **pulmonary tubercles** are very frequently latent for a very great part of their progress. So long as they do not undergo the process of softening, they may gradually invade a large portion of one or even of both lungs, without occasioning any material disturbance to the general health, or even so far disturbing the function of respiration as to attract forcibly the patient's attention. Cases even occur from time to time where tubercles of considerable size have softened and suppurated without the process being indicated by the usual outward symptoms, and without any marked disturbance to the general health. These facts are so familiar to every one who is extensively engaged in practice, — especially in hospitals, — that it seems unnecessary to illustrate them by any examples. The writer even knew an instance where numerous tubercles, evidently old, and some of them completely suppurated, were found in the lungs of a friend, who died of a totally different disease; namely, spreading cellular inflammation,

and who, till within a few days of death, was much addicted to athletic exercises.

Pulmonary tubercles, which have pursued a silent course, may even prove suddenly fatal; but in such cases there is always some accessory and obvious pathological condition superadded, which is the real cause of the fatal termination. One of these has just been exemplified; namely, pneumothorax. Another, of much more frequent occurrence, is rupture of one of the larger blood-vessels in the lungs, by erosion of its coats, occasioned by the proximity of a tubercle.

Diseases of the great vessels within the Chest come under the same designation with diseases of the heart, inasmuch as their course is frequently altogether latent, and their termination in death instantaneous. But in cases of instantaneous death, the immediate cause of death is always apparent in rupture of the vessel and sudden hemorrhage. It does not appear that diseases of the great thoracic vessels are ever circumstanced as in those frequent cases of diseases of the heart, where death takes place suddenly without any discoverable accessory pathological phenomenon, to explain why death occurred at the particular period, and not days, weeks, or even months before.

Of **Diseases of the Abdomen** there are several which may run a latent course for a very long time; but there are few which will remain latent to the last, like many of the diseases mentioned under the preceding heads.

Ulceration of the membranes of the stomach, proceeding from within outwards; ulceration of the intestines, of the same nature; ulceration of the gall-bladder, or of the biliary ducts; chronic organic derangement of the great secreting viscera, —more especially of the liver or kidneys; chronic disease of the coats of the large abdominal vessels; extra-uterine conception, of various kinds;—may exist for a great length of time, without occasioning any characteristic symptoms, or even, at times, any derangement of the health at all. In general, however, as they approach a fatal termination, they develop themselves fully by their external characters. But, on the other hand, they frequently prove fatal suddenly, or in a much shorter space of time than usual, in consequence of some incidental pathological change being produced during their progress. Rapid death, from perforation of the stomach or intestines; from rupture of one of the biliary ducts; sudden death from the rupture of a perforated vessel, or of a brittle spleen; or of an extra-uterine conception, &c., are more or less familiar illustrations of such a course of things. Of the last-mentioned remarkable and rather rare accident, the following important example occurred to the writer, a few years ago. The case was a medico-legal one; a judicial inspection having been ordered in consequence of various circumstances, which it is unnecessary to notice here, having led to a very strong suspicion of poisoning. The female died of a few hours' illness, referable, as it seemed, to irritation in some organ in the abdomen. She had enjoyed good health for some time before, except that four weeks previously she had miscarried about the middle of the second month of pregnancy. On dissection, the abdomen was found to contain several pounds of recently effused blood; and its source was a lacerated opening in a Fallopian conception, to all appearance in the course of the third month. The state of advancement of the ovum, the absence of the membrana decidua, and the exact correspondence in the appearances of a corpus luteum in each ovary, showed that the woman had had a twin-conception; one uterine, the other Fallopian. Another abdominal affection, which it may be right to specify as occasionally assuming the latent form, is the accumulation of worms in the intestines. Intestinal worms commonly occasion characteristic symptoms; and in some instances they have been known to produce death under symptoms of epilepsy, not merely in children, but likewise in adults. (Treatise on Poisons, p. 590.) But in other circumstances they have been observed to accumulate to an enormous amount, without their presence being suspected till the supervention of a convulsive affection, a short time before death; and in not a few instances worms have been found abundantly in the intestines, after death from some unconnected disease, although they were not indicated by any symptom during the life of the individual.

It is probable that various **Diseases of the Spine** may put on a latent course; but as the greater part of the organic disorders of this region of the body have been accurately discriminated only in recent times, facts are still wanting on the subject. Meanwhile it is well ascertained that *caries* of the bones of the spine, though in general it leads sooner or later to the production of symptoms which no observant practitioner can pass over or mistake, will nevertheless proceed at times to an advanced stage of its progress, and extend widely its devastations without any prominent sign of its presence being given forth. In one variety of it, which terminates in dislocation of the processus dentatus of the second vertebra of the neck, instant death may occur, where no suspicion existed of the presence of any disease in the actual seat of mischief. Under this head too may perhaps be arranged a very extraordinary case of sudden death related by Dr. W. Thompson of Edinburgh, where the individual, while recovering from an ordinary cold, was found dead in bed, and the only unusual appearance to be discovered was fracture and dislocation of the processus dentatus, without any disease in the bones or ligaments, and without the slightest possibility of a suspicion of violence. (Edin. Med. and Surg. Journ. xlii. 277.) In cases like this it may not always be easy to feel assured that the injury was not inflicted after death in the course of the twisting to which the neck is often subjected in opening the head.

The preceding remarks on the various diseases which may run a latent course must be taken by the reader as mere illustrations of the subject, and by no means as intended to exhaust the list. Other diseases are similarly circumstanced. But those which have been specified comprehend by far the greater number of them; and they have appeared to the writer, on reference to his own medico-legal experience, as well as to the valuable and extensive records of medico-legal cases in German and French journals, to be the most fre-

quent, and to bear the most important relations to medical jurisprudence.

The practical inference to be drawn from what has been already stated is, that, while latent diseases by occasioning sudden death frequently give rise to medico-legal investigations which are at once cleared up by the inspection of the dead body, we are not always entitled to infer, in circumstances of justifiable suspicion, that the discovery of such morbid appearances as indicate the pre-existence of latent disease will account for death,—that the latent disease was the occasion of death. For, during the latent period of the disease, death may have arisen from a different, perhaps a violent cause. This inference is not a mere theoretical deduction, but is amply supported by facts. For example, in Rust's Magazin is related the case of an apothecary who poisoned himself with prussic acid, and in whose body the lower lobe of the left lung was found consolidated and partly cartilaginous. (Mag. für die gesammte Heilkunde, xiv. 104.) In Corvisart's Journal there is a more remarkable case of a soldier who died of a few hours' illness, and whose right lung was found after death forming, it is said, one entire abscess,—the case being probably one of chronic pleurisy and empyema. Yet this man clearly died of poisoning with hemlock, of which he partook accidentally with several of his comrades; and it is not unworthy of notice, as a farther illustration of what has been said of pleurisy as a latent disease, that he daily underwent to the very last day of his existence the duties and fatigues of a military life. (Journal de Med. xxix. 107.) In Pyl's memoirs there is a similar account of a woman who enjoyed tolerable health, and died of a fit of excessive drinking, and in whose body the whole left lung was found in one mass of suppuration. (Aufs. und Beobacht. v. 103.)

One of the leading peculiarities which renders these singular cases important in a medico-legal point of view, in so far as it tends, on the one hand, to bring such cases forward in a medico-legal shape, and on the other to render the decision of them sometimes a matter of no small difficulty,—is that latent diseases are apt of themselves to prove suddenly fatal under the operation either of slight violence, or of the circumstances accessary to violence, such as passion, fright, struggling, and the like. The following are apposite illustrations. A foreigner, who was supposed to labour under no other disease except the natural infirmities of a rather advanced period of life, quarrelled one evening with his bed-fellow, and in the course of the quarrel received but one blow, which was inflicted with a stick over the back of the hand. But he immediately fainted, and in three minutes was dead. The heart presented induration of its valves, but in particular was unusually vascular throughout its whole substance, and was covered with a layer of coagulable lymph, clearly showing the pre-existence of one of the most common perhaps of all latent diseases, pericarditis. (London Medical Repository.) A more remarkable and much more difficult case occurred to the writer not many years ago. A pawnbroker who had for a long time been often and severely maltreated by his wife, returned home one afternoon very tired, and immediately afterwards was heard by a neighbour undergoing the customary domestic discipline. Fifteen minutes after he entered the house, a friend, who called for him, found him in bed in the agonies of death; and in a few minutes more he expired without having been able to answer any questions. His wife was accordingly apprehended under the charge of having poisoned him. A variety of medical as well as moral circumstances, however, precluded the idea of poisoning; and, although evident marks of the woman's violent conduct were visible in the shape of both old and recent contusions of the arms and legs, there was no indication of any violence adequate to occasion death; and the only way of satisfactorily accounting for death was by supposing, that amidst the circumstances accessary to the quarrel, he died of latent organic disease of the heart; for there was found, throughout the septum of the ventricles, and extensively also in the external parietes of the heart, a conversion of the muscular fibre into a substance resembling tubercular matter. Of this disease he had not presented during life a single symptom, although he was much accustomed to active exercise.

It is plain from the whole of the preceding line of statement, that in medico-legal cases involving the question of sudden death from latent disease, something more will be necessary for elucidating their nature than the mere discovery from appearances in the dead body that a latent disease had existed. In cases of death from obscure causes, it is in general considered sufficient in ordinary practice to explain its nature, if appearances are found in some important organ of the body of a kind which clearly indicates pre-existing disease. But this loose habit of inquiry will not answer in the practice of medical jurisprudence, for the appearances may be those of a disease latent to the last, and death may have arisen from a cause of a totally different nature, — possibly from the very kind of violence which is suspected to have been applied. It is necessary therefore to obtain some further evidence of the connection of the morbid appearances with the fatal event, otherwise we are not entitled to say that the cause of death has been natural.

The evidence to this effect may be taken from a variety of sources.

1. The first and most satisfactory evidence is where the morbid appearances indicate that the disease has brought into action one of the proximate causes of death, — that derangements of structure or function have been induced which must have been incompatible with the continuance of circulation or respiration. Thus we can have no difficulty in pronouncing the occasion of death to have been latent tubercles, where there is found along with tubercles either apoplexy of the lungs in connection with an opening in a large vessel, or pneumothorax attended with the peculiarities mentioned in a preceding part of this article. The cause of death is equally clear where chronic disease of a large vessel has been brought to a close by perforation of its coats and the discharge of several pounds of blood into the chest, or where latent disease of the heart has terminated in effusion of blood into the pericardium and stoppage of the heart's action by mechanical pressure. It is not often, however, that evidence

of the kind now referred to can be obtained. It happens much more generally that morbid appearances, which in ordinary professional language are said to be sufficient to account for death, are nevertheless such both in kind and degree as indicate an amount and progress of disease which numerous facts have proved to be quite compatible with the further maintenance of life, or even with apparently good health.

2. The next kind of evidence is furnished by certain peculiarities in the morbid appearances, which, though not, according to our knowledge of the animal functions, incompatible with the continuance of life,—and not indicating that any of the proximate causes of death have been brought into action,—nevertheless are known by experience seldom or never to occur except where death does immediately or speedily follow. Thus, where in a case of sudden death, the circumstances immediately antecedent to which are unknown, a recently completed perforation of the stomach or intestines be found, or a rupture of the gall-ducts or gall-bladder, and effusion of the contents of the ruptured organ into the peritoneum, death from this concatenation of causes may be safely inferred. It further appears from various cases, of which a few have been related above, that the same inference may be drawn where an extensive abscess of the lungs seems to have just burst into the cavity of the pleura through the investing membrane of the lungs. We cannot exactly say why death should supervene rapidly in such circumstances; for it often ensues long before inflammation can arise in the membrane with the surface of which the foreign fluid comes in contact: but the fact is undoubted that speedy death is almost invariably the result; and this fact may fairly be made the basis of induction where the circumstances preceding death are unknown or doubtful, and an opinion must be formed on morbid appearances alone.

It would be a matter of very great importance to discover some peculiarity of the kind we are now considering, in the instance of cases of sudden death from latent diseases of the heart. No species of sudden death is more common; yet pathologists have not yet furnished any explanation of the immediate cause of death. Does it arise from sudden paralysis of the heart, or from spasm, or sometimes from the one, at other times from the other,—from excessive gorging of the heart's cavities, or from the blood not being supplied in sufficient quantity? Or, leaving these questions in pathological physiology, by what characters, either in the morbid appearances or in the circumstances collateral to them, such as the state, quantity, or seat of the blood, may it be ascertained that an organic affection of the heart, presented to view in a case of doubtful or suspicious death, has or has not been the occasion of death? This query may probably receive a reply after a more careful examination of the appearances where death has unequivocally been produced by disease of the heart; but at present it must remain unanswered.

3. Another description of evidence by which death may be presumptively connected with morbid appearances found in the body where the cause of death is obscure, is derived from the occurrence of symptoms immediately before death, which correspond with the appearances discovered. Thus, where an individual dies under symptoms of sudden dyspnœa, and an extensive chronic pleurisy or peripneumony is found in the dead body, death is clearly to be referred to the latent disease. The same inference is allowable where symptoms of fainting precede death, and the appearance found is organic disease of the heart, or where coma and convulsions immediately precede dissolution, and suppuration and softening of the brain, or the traces of chronic meningitis, are discovered. In many cases of this kind, however, regard must also be had to the particular species of violent death which may happen to be suspected; because it may be that the symptoms antecedent to death are common both to the natural and the violent cause.

4. Hence, in many instances, before inferring death to have arisen from a latent disease, of which the traces are found in the dead body, it is farther necessary to determine, by as many proofs as the nature of the case will supply, that violence is improbable, if not out of the question,—and in particular, that the circumstances will not bear out the suspicion of the particular kind of violent death which is imputed. It is seldom that cases occur where this cannot be done, provided a skilful use be made of those mixed medical and general circumstances which no one but a medical man can properly collect or appreciate, but which, at the same time, it is right to observe that even medical men are apt to overlook or mismanage, from insufficient acquaintance with the principles of medical jurisprudence. This observation applies with peculiar force to that very common class of medico-legal cases where extraneous circumstances, in the instances of sudden death from latent disease, have given occasion to a suspicion of poisoning. A skilful toxicologist, who is also a medical jurist, will almost always discover proofs enough to decide the question of poisoning.

5. Additional information, by which much light may be often thrown on medico-legal cases involving the question of sudden death from latent disease, is derived from attending to the collateral conditions under which latent diseases are usually observed to prove suddenly fatal. These conditions are at least three in number. Many cases of latent disease have their symptoms first developed, or even prove suddenly fatal, during the additional constitutional disturbance occasioned by a fresh disease. Thus, it is not unusual for death to take place suddenly, in the early stage of convalescence from other diseases. A few years ago, a convalescent in the Royal Infirmary, an athletic young man, who was recovering from a slight attack of fever, followed by a relapse, suddenly called aloud for help, dropped down deadly pale, and died apparently in a faint; and on dissection, there was found considerable enlargement and hypertrophy of the heart, with complete adhesion of the pericardium. This is a single characteristic instance of an incident by no means uncommon in hospitals. A second still more common circumstance which concurs with sudden death from latent disease, is some unusual or violent exertion. Several of the cases mentioned above, in illustration of various general facts, will likewise illustrate the present statement. The

two following, which are related by Lancisi, are also excellent additional examples. A corpulent footman, liable to occasional dropsy of the legs, unequal pulse and uneasy breathing, dropped down dead one day while running after his master's chariot. The heart was much enlarged, particularly the right ventricle; and the left ventricle, usually empty of blood after death, was found much distended, as if it had been unable to expel the blood which was transmitted to it. (De Mort. Subit. i. 46.) Another footman, subject to palpitation and difficult breathing, yet so little incommoded as to be able to run habitually with his master's chariot, died suddenly after coition; and Lancisi found the heart enlarged to a size exceeding that of an ox. A third condition, in which latent diseases have been known to prove suddenly fatal, is during some violent emotion of the mind. This circumstance is even sufficient to occasion death, where the immediate cause of that event is some new accessary derangement of structure incompatible with the farther maintenance of life. It is a common cause, for example, of rupture of the great thoracic vessels. An interesting medico-legal case of this nature has been related by the late Professor Chaussier. Two men, who had been long on bad terms with each other, met one day in the street, when one of them, who was on horseback, struck the other across the shoulders with a whip. The man who received the blow immediately pursued the rider in a tempest of passion; but he had scarcely advanced a dozen steps when he dropped down, muttered a few indistinct words, and died. Many people witnessed the affray, and they all believed the deceased had been killed outright by the blow. But on the body being examined, no outward mark of injury could be seen; and it was subsequently found that an aneurism of the aorta had burst into the cavity of the chest. It is plain from the case formerly noticed of sudden death from latent pericarditis during a quarrel, as might likewise be reasonably inferred from physiological considerations, that latent diseases may prove suddenly fatal during violent emotions of the mind, even though no new accessary pathological injury be occasioned.

The general result of the observations on the present head of evidence seems to be, that any circumstance which produces either sudden violent excitement or sudden violent depression of the circulation, may cause instant or speedy death, where extensive organic derangement has accumulated silently in any of the important organs of the body.

By attending to one or other, or several of the criterions now laid down, it will seldom happen but that an opinion, strongly presumptive, if not even positive, may be formed on the question of the cause of death in the cases which are the subject of the antecedent comments. In some instances, however, this is impracticable; and an excellent illustration is the singular case noticed above of instant death after a blow, where there was extensive serous effusion into the ventricles, the effect probably of chronic latent meningitis. The circumstances of death were conformable with the idea of sudden death from violent passion, operating on a frame already brought to a peculiar condition by latent disease; for it was proved that the old man was in a state of high-wrought passion, in consequence of the misconduct of his son. But it may also be readily conceived that a blow on the head might have the same effect, though quite insufficient to occasion such a result in ordinary circumstances. The prisoner was found guilty of culpable homicide, and transported for life.

R. CHRISTISON.

LEGITIMACY. (See SUCCESSION OF INHERITANCE.)

LEPRA. — Λέπρα: from λεπρὸς-ρὰ, *scaly; th.* λεπὶς, or λέπος, *a scale.* A scaly disease of the skin, occurring generally in circular patches. At a very early period of medical literature, the confusion, which afterwards became "worse confounded," began to reign concerning the terms *lepra* and *leprosy.* The Arabian physicians had described the tubercular elephantiasis, the elephantiasis of the lower extremity, and some varieties of scaly disease, under distinct appellations, which became frequently misapplied. When, at the revival of learning, the works were rendered into the European languages, the Latin translator multiplied the perplexity by interpreting the Arab word *juzam* by the term *lepra,* which the Greeks had applied to designate the scaly disease defined above. In the middle ages the term leprosy was indiscriminately applied to the different forms of elephantiasis, the scaly diseases, and, in fact, to any form of chronic skin-disease which was bad enough to entitle the subject of it to admission to the lazar-houses which were established over Europe at that time, where the indigent were glad to get the subsistence they provided at the expense of being called lepers. This confusion has been a subject of complaint with writers from age to age, yet it became perpetuated. Hensler's learned treatise,* written with a view to elucidate the subject, left it nearly as complicated as ever; for he and Sprengel treated under the term leprosy the various forms of elephantiasis, the Greek leuce, and the proper scaly lepra. Many modern writers do not appear to desire the removal of this obscurity, as they persist in describing the former of those under the name of leprosy. We trust, however, that medical men will now see the expediency of adhering to Willan's correct nomenclature in this instance, which restores to the term lepra its proper and original signification, namely, the scaly disease, the subject of this article.

History of the Disease. — Lepra generally begins on the extremities, below the larger joints, where the skin covers but thinly the tibia and ulna respectively. It commences by small, roundish, smooth points, slightly prominent above the surface of the skin, which soon become red and shining from being overlaid by minute transparent scales. These become soon detached and replaced by others. The eminences by degrees enlarge; the scales become thicker, and are chiefly formed on the circumference of each spot. They observe the circular form in spreading, and attain the size of a shilling or a half-crown piece; and as they increase, the circular border becomes raised and en-

* *P. G. Hensler.* Vom Abendländischen Aussatz im Mittelalter, nebst einem Beitrag zur Kenntniss und Geschichte des Aussatzes. Hamburg, 1792

closes a red area, which is free from the squamous development. A red areola is also perceived external to the raised circumference where the scales collect. These orbicular patches, in spreading, touch and intersect one another; and though in this stage the circular form is lost, we may still trace the segments sufficiently well to show their original conformation. They unite usually first at the elbows and knees, the parts, as we have said, where the disease first shows itself. In the progress of the affection, while the existing patches are enlarging in this manner, new ones arise; the abdomen, the back, and the chest become affected; and in some cases it spreads to the head, face, and hands.

The scales fall off and are renewed very frequently. Sometimes they are so easily detached and form so rapidly, that the patient's clothes and bed are filled with scales, which cause some irritation: in other instances they adhere more firmly, and accumulate in such quantity as to impede the motions of the joints,—a still greater source of troublesome annoyance.

By their multiplication the scales become aggregated apparently in an irregular manner; yet each one is propagated from a centre, and is attached by a pulp to the dermoid tissue: this fact is proved by tearing one off, when a slight red speck is seen to project from the middle of the inferior surface, corresponding to a depression in the spot whence it has been displaced. When the disease has lasted long, or is in process of cure, the scales, as they fall, present the reticular eminences proper to the cuticle, and leave the surface red, smooth, and marked by corresponding reticulations.

The description here given will apply to the great majority of cases of lepra, but it presents varieties derived from its extent, duration, and treatment. The accidental circumstances of situation and colour also impart to it certain peculiarities.

It sometimes covers the whole body, commencing for the most part from the extremities; it begins usually on the two arms and legs at once, and propagates itself, as described, to the trunk; it rarely spreads to any extent on the face: the forehead, the temples, and the external angles of the orbits are, however, often the seat of some scaliness spreading from the hairy scalp. When the scalp becomes affected, the scales are very minute, and generally cover an exudation derived from the inflamed bulbs of the hair; a moisture is also remarked to accompany the scaliness when the disease invades parts where there is a necessary friction, or places furnished with many sebaceous follicles,—as the nates and inside of the thighs, the axilla, the verge of the arms, &c. These form exceptions, however; for it is one of the essential characters of the disease that the desquamation is quite dry.

In cases of a very chronic nature, where the disease is of such extent as to spread over the hands and invade the root of the nails, these become much altered in structure, curved, and of a dirty yellow colour. It has been observed in some rare instances that the dermoid tissue which secretes the nail has become inflamed and furnished a sanious discharge. (*Rayer.*) In the cases which are complicated by any of those accidental secretions, the lymphatic glands sometimes inflame and swell, as Richter remarks; but we cannot admit into the description of lepra the rhagades and ulcerations which are mentioned in his excellent work. (Specielle Therapie, vol. vi. p. 440.)

A remarkable appearance which lepra sometimes assumes has induced accurate observers to recognise in it a peculiar species of the disease. It has been observed on parts of the trunk that a complete desquamation over a considerable surface takes place without being followed by any reproduction of scales in this particular place: it remains red and smooth, and still affects the circular form; and not only is the whole area round and bordered by a slightly raised margin, but it contains within it some patches, either circular or obviously showing a disposition to that form, yet without scales either on the centres or the raised borders — their usual nidus. What makes this variety more remarkable is, that whilst the patches exhibit this feature probably on the back, it is as scaly as ever on the extremities. We must not, however, suppose that this partial absence of scaliness in such rare cases makes any exception worth notice in the history of lepra; in some instances it probably depends on idiosyncrasy, but we think it is more frequently a partial curative effort of nature, or the effect of medicine, which from some unaccountable cause is arrested after having proceeded only so far as to check the morbid secretion of the cuticle, the vascularity still remaining. This explanation is rendered the more plausible if we consider the locality of the phenomenon, and the manner in which the disease usually advances towards a cure in the cases where we can trace its disappearance under the influence of medicine. Its situation, as we have said, is on the trunk, almost invariably on the back; and it is here that, when lepra begins to yield to any of the methods of treatment to be mentioned afterwards, the effect is first visible.*

The constitutional disturbance attending on lepra is for the most part very trifling, particularly when we consider the large cutaneous surface which is frequently engaged; sometimes a slight fever, accompanied with gastric symptoms, coincides with its first attack; but when established, it goes on for months and years without constitutional symptoms of any import arising from it. Its most troublesome accompaniment is a disagreeable pruritus, which attends its commencement and increase. This occurs particularly when the circulation is excited by exercise or full diet, and when the warmth of bed exalts the cutaneous action: it is sometimes aggravated to a burning heat which is most intolerable. This itching and tingling is not peculiar to lepra, but is met with in most diseases of the skin attended with inflam-

* It appears to be a law in pathology that the resolution of a disease commences from the place to which it has last extended: of this pneumonia is an instance familiar to stethoscopists, yielding first where it is most recent. It also sometimes affords an example of a state which we think is analogous to the appearance of lepra which we are discussing,—we mean those cases which will, no doubt, present themselves to the memory of accurate observers, where the pneumonia, after proceeding a certain way towards resolution, remains stationary, neither going backwards nor forwards. This appears to us to be the nature of the appearance adverted to particularly by MM. Cazenave and Schedel.

mation, and is often present in a greater or less degree as a symptom of internal disease. Mr. Plumbe's explanation of this phenomenon is too mechanical, and, though ingenious, inadmissible. He thinks that it is to be referred to the raising up of the scales by the increasing development of the "inflamed margin, and fresh growth of scales, the centre which was attached to the cutis being thus forcibly torn from such attachment." He supports this opinion by the observation that the pricking occurs most constantly at the commencement, when the new scales are oftenest detached, and seldom happens when the disease is subsiding. We consider this pruritus to be a morbid sensation, depending probably on an altered secretion in the skin, and the reason appears to be very obvious why it happens in the commencement. The morbid secretion which forms the scale affects the sensibility of the skin more strongly at first, when the impression is new, than afterwards, when the squamous deposits become an accustomed stimulus to it; and besides at this period the cutaneous sensibility becomes somewhat impaired: the subsidence of the disease is of course not marked by pruritus, as the vascular irregularity producing the scaly secretion is now returning to the physiological state. This explanation is applicable to the itching and tingling of other cutaneous affections, and to that which is symptomatic of hepatic and other visceral derangement.* Hippocrates remarked that the pruritus increased before rain.

Although much constitutional disturbance be rare, yet if lepra spread over the whole body, and is severe in degree, it often produces some anxiety and febrile excitement, partly from the general extension of the sub-inflammatory state of the skin, and partly from the mere mechanical annoyance that the scaly incasement gives rise to by obstructing the free motion of the joints, which become sometimes painfully tense, and so stiff as to oblige the patient to keep his bed.

Willan and Bateman, endeavouring to systematise different terms used by the Greek writers, divide their genus lepra into three species, a division which is considered unnecessary by the most judicious writers. Their lepra vulgaris is the disease we have described here, and comprehends all the varieties.

Lepra alphoides is a mere variety of the common lepra, possessing the same essential characters, and requiring similar treatment. It is a form in which there is less redness of the skin and elevation of the circular margins: the scales also are smaller, and of a more pearly whiteness. It seldom reaches the trunk, and it generally attacks children, aged persons, or those of a weakly habit of body. It appears to be a variety of the disease in which the morbid action is less energetic, modified probably by some constitutional peculiarity.

Lepra nigricans is confessedly a rare form. M. Biett insists that this has invariably a syphilitic origin, and we agree with him in this view of it.

Secondary syphilis, as it assumes almost every form of cutaneous disease, appears sometimes under that of lepra. It is a question with pathologists whether the syphilitic diseases of the skin are to be separated from the others in nosological arrangement: they agree in anatomical characters, put on the same form, and in many instances yield, temporarily at least, to the same treatment. Notwithstanding these points of agreement, however, the most esteemed authors consider that they should form a separate class. Their venereal origin furnishes a much more important reason for distinguishing them than any consideration arising from their agreement in form affords for keeping them together, as it is an indication for a special line of treatment, the disregard of which might be attended with disastrous consequences.

Lepra more commonly affects men than women, but the difference as to sex is inconsiderable. Youth and middle life are more liable to it than infancy or old age; but no age is exempt from it, after the first dentition to the latest period of life. It appears to be less affected than the other skin-diseases by the influence of seasons; but it is observed to be most common in autumn. Differences of condition and circumstances in life have not a decided influence on it, except so far as they favour the development of the predisposing cause. Willan considered cold and moisture to be a frequent cause of it, and says that it is often excited by external irritants and dry sordes on the skin. Bateman differs with him in this, as he has seen it frequently in persons whose respectable rank and circumstances precluded these causes, while he has not observed that certain classes of workmen, necessarily exposed to them, were particularly affected with it. Like the other cutaneous diseases, it has been known to succeed to a disordered state of the digestive tube and of the biliary organs; but we must consider in these cases that there has been a great predisposition present; and it is one of the diseases where the latter acts a principal part. Where a predisposition prevails, the slightest causes are sufficient to give rise to it; thus it has been produced by highly seasoned food, spirituous potations, violent exercise, and strong emotions of the mind; anger is said to be a frequent exciting cause of it: mental depression also produces it, especially that arising from unexpected poverty and the bad diet accompanying it, as in the interesting case narrated by Dr. Mackintosh. (Practice of Physic, vol. ii. p. 217.)

It is quite certain that lepra is not contagious; and discussions on the subject could only have been entertained when a total disregard of precision permitted diseases of the most distinct nature to be classed under this most abused term.

Pathology.—It is sufficiently obvious from the enumeration of occasional causes, that we are not aware of any determinate conditions in its origin. That lepra is an inflammatory disease there can be no doubt; but as the term inflammation does not convey any very defined notion as to proximate causes, this is but a vague account to give of its etiology. We cannot in fact conceive any change taking place in the organization of the skin without a change in the organic action

* There is an analogy between those morbid sensations of itching, pricking, tingling, &c., and the muscæ volitantes, flashes of light, and tinnitus aurium. They are all irregular impressions on the sentient extremities of the nerves; in the latter on those of vision and hearing, in the former on the nerves of touch. Diseases of the chylopoietic viscera and the brain give rise to both classes of vitiated sensations.

of its ultimate tissue or capillary vessels; and wherever this takes place, it constitutes a phenomenon which has hitherto been denominated inflammation. Observation of the mottled arms of healthy infants shows that the cutaneous capillaries in their physiological state affect something like an orbicular arrangement; and this might be in some measure connected with the fact, that most inflammations of the skin originally observe a rounded form. Further than such a simple step, however, our knowledge does not permit us to advance in the etiology of this, or indeed of any other skin-diseases. In Mr. Plumbe's work an attempt is made to ground the pathology of cutaneous diseases on the part of the dermoid tissue affected, and to specify the class of vessels diseased in each morbid alteration. This would be very desirable, but is wholly unattainable in our present state of knowledge. Anatomy teaches us hardly any thing about the arrangement of the capillaries of the skin. We are totally ignorant as to whether there be separate vessels for the secretion of the tissue of the corium, the rete mucosum, and cuticle; and whether the transpiration and sebaceous matter are furnished by these, or have separate vessels for their elaboration: it is gratuitous, therefore, to say that the seat of the inflammatory action which constitutes lepra is in the vessels which secrete the cuticle, merely because cuticle is the product of the inflammation; for this is to assume that the different tissues are formed by different vessels, a conclusion which has never been proved, and which modern physiology gives reason to suspect is untrue. If the argument were admitted, it would infer a separate set of vessels for every product of inflammation of the skin. It is, however, unsuitable to proceed with a discussion of this nature in this place.

Diagnosis.—The disease which most resembles lepra is psoriasis. The earliest observers of squamous diseases marked the difference which exists between them. Paul of Egina marks the distinction which depends on their form, in these words: "Λέπρα per profunditatem corporum, cutem depascitur *orbiculatiori modo*, et squamis piscium squamis similes dimittit. Ψώρα (psoriasis of the moderns) autem magis in superficie hæret, *varie figurata est*;" but if no other difference existed than their configuration, we might be induced to follow the example of some respectable authorities, and to describe them together as mere varieties of the same disease. They differ, however, in more essential respects. Lepra is a more chronic disease than psoriasis, both as to duration and effects; it does not excite the same amount of sympathetic disturbance in the constitution, and is less affected by the relations of temperament, seasons, climate, &c.; in fact when it once sets in, it appears to become more inveterately wedded to the constitution than its congener, which, although it produces greater local and general irritation, is yet more amenable to the resources of medicine. Its general aspect, indeed, sufficiently distinguishes it from every species of psoriasis except one. The circular margins enclosing the central red part free from scales are quite contrasted with the irregular scaliness of psoriasis, cracked often by rhagades and ulcerations. The psoriasis guttata, however, appears to be a near approach to the character of lepra, and to constitute a natural alliance between them: the same round spots, gradually increasing and becoming covered with scales, characterize both, but it is only at the very first stage and at its declension that they are very similar; for when it is fully formed, the patches are much larger, and have assumed the annular form mentioned above, whereas the smallness of the patches, their *whole* surface being covered with minute furfuraceous scales in psoriasis, is sufficiently characteristic, so that whilst their agreement in some things shows them to belong to the same family, yet there appear to be sufficient points of peculiarity in each to enable a careful observer to make a tolerably confident diagnosis. Several eminent writers are strenuous advocates for their being united on the grounds of similarity, and lean much on the fact that sometimes in psoriasis there are present some patches which have all the characters of lepra. We acknowledge this fact, but we do not think it a valid argument, as it would hold good for uniting many cutaneous diseases which all agree to separate, as, for instance, eczema and impetigo, because the vesicles of the former are frequently intermixed with the pustules of the latter. While, therefore, we acknowledge their affinity, and that their treatment is similar, yet, from the differences detailed above, and these as particularly affecting their prognosis, we are for maintaining them distinct, and the weight of authority is on our side.

There is a possibility of confounding some other diseases, which affect a circular form, with lepra. In the state of the ring-worm of the scalp, when the purulent incrustations are detached, a red ring remains, which is sometimes covered with a slight scaliness. This might be mistaken for a lepra of the scalp, and the more so if the porrigo be a little developed on the body; but a little attention will detect the difference between the aspect of the ring-worm and the leprous patches; the former is covered over with a small laminar scab rather than a semi-transparent scale: the hair, which falls in the ring-worm, is preserved in lepra, and a few days' watching will develop the favous pustules from which the scab is secreted. If contagion can be established, as it generally can in the porrigo scutulata, it decides the question at once; but the chief element in the diagnosis is derived from considering that it is much rarer for the porrigo to be found on the trunk and extremities, than for lepra to be seen on the head, and that respectively they for the most part spread in contrary ways, the lepra from the extremities and trunk to the head, the porrigo from the head to the body. (*MM. Cazenave et Schedel*, Maladies de la Peau d'après M. Biett.)

With respect to the syphilitic eruptions which assume the guise of lepra, their diagnosis is not difficult, and this fortunately, as it is of more importance to be positive in this case than the former, the consequences of mistake being much more serious. The syphilitic squamous disease, called by Willan and others lepra *nigricans*, represents the figure of lepra; but the violet, coppery, or black colour, which is its essential characteristic, is quite sufficient to stamp its origin. The round, flattened, circumscribed concretions constituting the tubercular syphilis, called some-

times by us incorrectly pustular eruption, might impose on us also for lepra; but here the coppery colour, which is happily for our diagnosis an inseparable companion to the venereal taint, comes again to our aid. But even if we had not this unerring distinction, a little examination evinces that the tubercular spots, although disposed in rings, are very different from the circular patches; and the thin squamous lamina, which is sometimes observed on the tubercles, is disposed just the reverse of the leprous scales: it spreads from the centre, and is only a partial covering, never large enough to conceal the circumscribed induration which projects beneath.

Prognosis.—Lepra is to be reckoned, under the most favourable circumstances, as a disease very difficult of cure, and in many cases incurable. In old or debilitated subjects, scarcely any means are sufficient to eradicate it; but in those of an opposite habit success is never to be despaired of, as there are many cases on record of its being quite removed after twelve and sixteen years' standing. It is not dangerous when it is a primary disease; for even when nearly the whole skin is encased by its scaly concretions, the injury of its function seldom involves the system in general disorder. This is a statement of a general rule, to which, of course, exceptions will be found in those whose organization is bound together by a greater sympathy—idiosyncrasies* of constitution, which it is impossible to foresee as it is to explain when developed. The obstinacy with which it adheres when once engrafted on the system, shows itself sometimes by the inefficacy of every means to prevent it spreading over the whole body; and again, in other cases it disappears spontaneously or under the influence of medicine, in one place, and while the patient is congratulating himself on its departure, it suddenly appears in another part of the body. On the other hand, it has been known, after lasting for months, or even for years, gradually to subside of its own accord under the influence of some of those inexplicable changes to which the human body is liable. It appears to have sometimes gone on to a fatal termination; and the description of its ultimate encroachment on the vital functions, while it suggests phthisis, presents some singular features. "The local disease having reached its highest degree, a remarkable constitutional affection appears. The patient now becomes very languid; asthmatic, particularly at night-time; smothering fits seize him; he coughs violently and spasmodically, and spends the night in perfect sleeplessness, falling into excessive, colliquative, clammy sweats, which give an intolerably fetid odour. His voice becomes weaker and hoarser; the appetite for food and drink is preternaturally increased; and the temper becomes gloomy. Finally, various nervous symptoms arise, faintings, convulsions, paralysis of some parts, and death arrives preceded by the highest degree of exhaustion." (*Richter*, Specielle Therapie, vol. vi. p. 440.)

Treatment.—The history of the treatment which has been from time to time employed presents a picture of the prevailing medical dogmas, and at the same time indicates the obstinate nature of the disease; for where so many various remedies have been lauded for their success, it only proves that experience has not established that any one has been generally successful. It would take up a large space to furnish a mere catalogue of the various substances which the three kingdoms of nature have been ransacked to supply for the cure of this disease in different ages. Empiricism, aided by superstition, was, in the early times, perpetually devising something new from the animal kingdom; from the flesh of the harmless ass, recommended by Hippocrates and mentioned with applause in the writings of T. Bartoline, and the bull-frogs of Myzaldus, to the poisonous viper, which Galen hails as one of those great discoveries which accident has furnished to mankind. (De Simpl. Med. Facult. lib. xi.) In the vegetable and mineral kingdoms, almost every article used as a drug has had, at one time or other, its favourers, from the most innocent herb to arsenic; and each has been extolled as a specific. In describing the treatment, however, we shall only take notice of those remedies of which the efficacy has been proved by the experience of men who have made their therapeutic virtues the subject of investigation since cutaneous diseases have been studied after the modern improvements in pathology.

One great reason why remedies have been extolled beyond measure by some as certain specifics, and denounced unmeritedly by others as quite useless, is, that former writers have mostly neglected to mark the particular features of each case in which their remedy succeeded or failed. Having determined that it was *the leprosy* they had to do with, they appear to have gone to work with their favourite nostrum, without taking into account, or at least without recording, the most important therapeutical indications of the affection.

The first grand consideration in a rational treatment has respect to the cause. Can we trace its dependence on any internal disease? If so, it is vain to expect its cure until the primary disorder be successfully attacked; while it is unpathological to make it the object of *chief* attention: we say chief, because, although only a symptom, yet it is not, even in this case, to be entirely neglected, as its reaction may have a powerful influence on the original focus of the disease, and this in two ways, which it is highly important to distinguish. Its appearance on the skin may afford a salutary natural derivation, and in this case it would of course be injurious to endeavour by treatment to repel it: in another instance the disease of the skin may be only an additional source of morbid action, and react on the primary affection in a prejudicial manner; so that here, although but a secondary phenomenon, it must become an object of treatment. It is only tact and much observation that can discern these different circumstances; they do not often, however, fall under consideration, as lepra is one of the cutaneous inflammations least frequently complicated with organic disease of the viscera.

It needs scarcely be mentioned that if the skin affection can be traced to any external cause, whe-

* We owe an apology for the use of this word, which is, indeed, but a confession of ignorance, although cloaked by so learned a term. It really means that the fact which is referred to it cannot be explained by any recognised law in pathology.

ther it be mechanical irritants peculiar to any trade or locality, or endemic agents operating through the atmosphere, the patient must be withdrawn from their influence. Thus, if it occurs from the influence of a cold and moist climate, or that it can be imputed to sordes on the skin, (both which circumstances Willan reckoned as common causes,) in the first instance the patient should remove to a dry atmosphere; and in the latter he should change his occupation to some that would not necessarily expose him to the exciting cause; and it is the medical man's duty, if he have ascertained any of these sources, to insist upon the absolute necessity of taking this step, being aware that the comfort which flows from health may be taken from the patient for the remainder of his life if he neglect it.

The cause being investigated, and the treatment with respect to it having been considered, the age and constitution of the patient, and the extent and duration of the cutaneous affection, are the circumstances upon which we ground our judgment in proceeding to apply remedies for its cure. If the patient be young and strong, (and lepra usually occurs in such patients,) general bleeding must be performed; and if the disease has not become very widely extended, and inveterately chronic, the abstraction of blood by the lancet will frequently be attended with great benefit. The application of leeches in the neighbourhood of the leprous patches is also very effectual; and the disease in some instances yields to a few general bleedings, accompanied by leeching. The local bleeding by leeches is inadmissible when the malady has extended over the whole or a great part of the body; but when it is confined to one or both arms or legs, we can speak in the most decided manner of the great benefit derived from their use. In the comparatively recent cases the application of leeches two or three times, preceded by abstraction of blood from the arm, will be generally followed by a great diminution of the central and external redness and of the desquamation; in fact, sometimes by a speedy disappearance of the disease without the use of any other measures of importance.

The circumstances which peculiarly demand the abstraction of blood are, an active irritable state of the patches, and the existence of feverishness or great uneasiness from the prickling sensations; but it has of late years been proved that bloodletting is an excellent adjuvant to other means. In fact, a great improvement in the treatment of skin-diseases generally has taken place since the utility of bloodletting has been recognised in reducing the inflammation from an active to a passive state. It will much facilitate the cure of even the smallest extent of the disease to begin by a good bleeding; but it is in cases where it has spread very generally over the body that the bleeding is to be mainly depended on, at least at the outset of the treatment.

Dr. Duffin, whose large experience of this remedy is very favourable to its use, after pointing out its striking usefulness in the circumstances adverted to above as peculiarly requiring it, adds, "but supposing that there exist no general symptoms, still this mode of treatment is very often proper, were it had recourse to with no other view than to subdue the irritability of the skin or its extreme susceptibility to disease. But it has another good effect—it induces a state of the system that admits of being much sooner affected by the use of arsenic, when the active symptoms have been so far subdued as to allow of the employment of that medicine." Its effect as a preparative is, indeed, the chief improvement we alluded to; and since it has been so employed, many remedies whose efficacy was much debated are now found decidedly useful, their exhibition being preceded by a bloodletting, and recourse being had to it during their use occasionally, if any symptom of the active inflammation re-appear. It would be obviously improper to employ it if the patient be in a debilitated state, the effects of a bad constitution, of the long duration of the disease, or of old age.

Amongst the external remedies the bath is indisputably the most effective, and most generally used. The simple tepid water is very much employed, and is not superseded by the many new methods of bathing or vapourizing the surface. The painful stiffness and irritation are almost always relieved by a twenty minutes' immersion in water at 90°: it appears to us to promote cleanliness, and a softening and falling off of the scales, just as well as the vapour-bath; but the latter is preferred by many experienced practitioners. The tepid salt-water bath is still more effectual as a stimulant to the skin; but it is to be used only when the inflammatory state has been entirely removed by the antiphlogistic measures.

Much expectation had been raised as to the efficiency of medicated vapours in this and the other squamous diseases; but their superiority to the ordinary baths has not been demonstrated. The sulphur vapour-bath is the most powerful stimulant amongst them, and it has certainly been used successfully in some obstinate cases; it must, therefore, be kept on the practitioner's list, to be employed where other remedies are inapplicable or have already failed. The vapours of tar and of acetic acid have been much used, but they are not so highly esteemed as those of sulphur; but, indeed, experience has not established for any of those fumigations the virtues which were proclaimed at their first trials. Bathing in the medicinal waters containing sulphur, such as Harrowgate, Lucan, Leak, St. Gervaise, &c. is decidedly a means of great power in scaly diseases, and many extraordinary cures are attributed to their use. When they are recommended, and the patient cannot remove to any sulphurcous spring, a useful substitute may be readily made by dissolving six ounces of the sulphuret of potash in ten gallons of tepid water, and adding a small quantity of the sulphate and muriate of soda (eight ounces of each.) Bathing, however, whether it be local or general, and medicinal fumigations, are only to be relied on as a secondary remedy; they are not to be used till the active irritation be removed by depletory measures; and it follows from this that they are particularly applicable in the chronic cases, and in patients of a debilitated habit, where the disease is but little energetic: they must be persisted in for some time to produce a beneficial effect, and the vulgar opinion that they weaken the constitution is to be entirely disregarded, for

the contrary is the fact, as the patients will be found to derive strength from every means that exerts a salutary influence on the cutaneous disease. In many states of the skin where tepid bathing is advisable, its action will be much aided by gentle friction with a soft flesh-brush, the use of which is deservedly extolled by some writers.

Topical applications in the form of ointments and lotions are very useful in many cases. They are intended either to allay irritability, or, from their stimulating effects, directly to attack the disease by altering the action of the skin. In the former kind is reckoned the Carron liniment, which, spread over the leprous patches has been found to cool the skin, and keep it soft and comfortable; the addition of two drachms of oil of turpentine to eight ounces of it, renders it a gentle stimulus which can be borne in almost all cases, and adds much to its good effects; it is one of the simplest applications, and can be used over a greater surface than others of a more powerful nature. Dr. Duffin prefers an ointment composed of equal parts of diluted citrine ointment and tar ointment to any other topical remedy in the chronic cases, and states that it may be applied very extensively over the body without dreading its affecting the mouth, or producing any other of the effects peculiar to mercury. The patient is to be directed to remove the old ointment perfectly previously to laying on a fresh application, and to use for this purpose an alkaline lotion, made of two drachms of liquor potassæ to six ounces of water. The ointment adheres with great tenacity, and he "thus unconsciously submits the parts to a very perfect ablution and considerable friction, two agents of the utility of which no person can doubt in the case of lepra."

M. Biett, who thinks that ointments in general are of but little service, yet places confidence in one composed of the ioduret of sulphur and lard, twelve or fifteen grains of the former to the ounce of the latter. It is a very valuable remedy in recent lepra, occurring in a weakly individual who could not tolerate active internal medicines: it should be applied by a gentle friction to a few patches at a time, after a tepid bath: the skin's activity increases under its use; the circular elevations are reduced to its level, and the scales fall; and when the natural state is nearly restored in one part, new patches are to be attacked, until the resolution becomes complete.

Besides the Carron liniment mentioned before, the smearing of the patches with cream or with fresh butter, [or with cod-liver oil,] has been extolled as very efficacious in allaying irritation from the rigidity of the skin; and we can recommend with confidence the use of these emollients as excellent adjuncts to the general means of bleeding and purgatives, (which must be the chief reliance as we have mentioned before,) when the heat, itching, and stiffness give great annoyance.

A lotion that was held in much repute for detaching the scales when they adhere tenaciously, is a decoction of the stalks of dulcamara with some alkali: it is said even to bring the skin to a healthier condition. We should remark that benefit from these external applications, liniments, ointments, &c., is to be looked for chiefly when the disease is confined to the extremities, and shows little disposition to spread.

[In chronic cases, the ointment of iodide of mercury; or a liniment of the red iodide, or an ointment of the same; or the solution of iodide of mercury and arsenic, diluted with an equal quantity of water; or the tar ointment; or an ointment of creasote, or a liniment of the same; or an ointment of the sesqui-iodide of carbon, or of the iodide of ammonium, has been prescribed in the same cases as the iodide of sulphur. It has, also, been advised, that the patches should be touched with a liniment, composed of olive oil and rose-water, each an ounce, liquor potassæ, half an ounce; and, when they are small, they may be sometimes touched with advantage with strong acetic acid, or aromatic vinegar, or the mineral acids, when diluted: but, as elsewhere remarked, (*Practice of Medicine*, 2d edit. p. 137,) care, it need scarcely be said, must be had in the employment of these potent agents, and they never can be proper in the early and inflammatory stage. Recently, anthrakokali and fuligokali—simple and sulphuretted—have been recommended, both internally and externally; and Mr. E. Wilson (*On Diseases of the Skin*, Amer. edit. p. 360, Philad. 1843,) affirms, that he has employed fuligokali in several cases of lepra and psoriasis, and especially in psoriasis palmaris, and with better success than he had obtained by the usual remedies. The preparation and mode of administering these remedies are given elsewhere. (*New Remedies*, 4th edit. p. 57, and p. 321.)

Cantharides have likewise been prescribed externally. Dr. Davidson of Glasgow, (*Lond. and Edinb. Monthly Jour. of Med. Science*, Dec. 1841,) noted the comparative effect of iodide of sulphur, and the *Acetum Cantharidis* of the Edinburgh Pharmacopœia, in an inveterate case of several years' standing, in which a variety of remedies had been tried in vain. The iodide of sulphur was applied to the lower extremities, and the acetum cantharidis to the arms; and, from the result of his observations, he is satisfied that the latter had more power as a local agent. He found, however, the proportion of cantharides in the official formula too small, and therefore doubled it. Dr. Davidson recommends the following liniment, which is a modification of the *Emplastrum Cantharidis* of the Edinburgh Pharmacopœia, as superior to any preparation he has tried. It is sufficiently soft during warm weather to be applied with a brush; but requires to be heated when the temperature is low. (*Adipis, Ol Rapii, Cantharid*, pulv. āā ℥i.) In order to succeed with any of these vesicating agents, the skin should be previously softened, either by the warm bath, or by sponging with warm water.]

The most effectual means for combating lepra are, however, to be sought for in the internal medicines; and the experience of able observers has proved a great number of these to possess undeniable power.

The use of different medicated waters, as those of Harrowgate and Leamington in England, and of the different waters on the continent which contain sulphur, has been a long time established as very beneficial; we have of late had occasion to know of several cases that have been cured by

drinking the water of Lucan Spa which resembles the Harrowgate, but is not so strongly impregnated with sulphuretted hydrogen. This is a much better way of administering the sulphur internally than either the simple flores sulphuris, or in combination with antimony, the golden sulphuret of which was once a favourite remedy in cutaneous diseases. The mineral waters should, if possible, be drunk at the source, or at least be procured from it: as it is a fact that their imitations are not so efficacious as the waters of the springs.

The dulcamara has certainly properties which entitle it to notice. Dr. Crichton's testimony was very strong in its favour, and brought it much into use in the treatment of lepra. He states that out of twenty-three cases in which he employed it, only two resisted its action; two or three ounces of the decoction of the twigs and leaves were used by him thrice a-day; but we cannot help being inclined to attribute his success rather to the other means which he used, as the experience of other physicians who have used it still more extensively does not corroborate its virtues: it is still used, however, as an adjunct, in chronic cases.

Decoctions of the acrid stimulant plants, daphne mezereon, d. enidium, and of guaiacum, have been used with success in different instances. The compound decoction of sarsaparilla has also enjoyed much reputation, and may be recommended for its stimulant effects on the skin: its use should alternate with some of the more powerful remedies to be mentioned.

A remedy which at one time was extolled to an extravagant degree, and has fallen in late times into as undeserved disrepute, is the tar-water; but we are persuaded on the grounds of experience that it does possess real efficacy. A case has been communicated to us, which had been treated by some of the most eminent practitioners with the most powerful remedies: but no effect was produced on the disease till tar-water was tried by a physician whose experience of it led him to place much confidence in it; and under its use the patient got quite well. Half-a-pint of it should be drunk three times a-day. In the case alluded to the patient was made to walk rapidly until he began to perspire, and then to sit for a time in a warm room, and much importance was attached to this manner of exhibiting it. Pitch pills are also to be mentioned as a remedy to which experience bears a very satisfactory testimony; six or eight of them, each five grains, should be taken for a dose three times a day, and this will have to be increased by degrees according to circumstances.

Some English writers praise very highly the treatment by mercurial preparations; and in some cases minute doses of corrosive sublimate have proved of unquestionable utility, salivation by mercury being, however, seldom undertaken in the cure of lepra. The naïve relation which that respectable writer, Dr. Turner,* gives of its effects in two cases where he employed it, would answer for its history in most cases; and as a purgative, indeed, calomel will be very beneficial in occasional doses, no matter what plan of treatment be preferred; and in children particularly it is a very useful means.

We now come to speak of arsenic, a remedy that has been of late years much investigated as to its effects in squamous diseases. While some have found it to possess uncommon virtues, others have decried it as not only useless but dangerous. It is, without doubt, a very dangerous remedy in the hands of incautious practitioners, and will never prove useful if it be employed where circumstances contra-indicate it. But we must express our suspicion that where it has failed, it has been for want of discriminating between the states which are favourable to its action, and where its administration is improper. It is superfluous to say that its exhibition requires the most cautious attention on the part of the practitioner; and we are confident, that where it is judiciously employed, it is not only a safe but a very valuable remedy. It seems to be peculiarly applicable in those cases which are seldom benefited by other medicines — we mean those instances in which the lepra has lasted for several years, and has invaded nearly the whole skin, so that it has taken on such a diseased habit, that nothing less than the most powerful means will restore its original state. In cases which have not run on to a very chronic state, the other means will prove as effective, and probably should be tried before we should have recourse to the arsenic, although some able practitioners advocate its propriety in almost every case. In the inveterate cases, however, when all other means have failed to produce any salutary effect, its well-regulated exhibition has been frequently known to effect the dispersion of the disease.

Having determined on its use, we must watch its effects, and persevere so as to give it a fair trial. Fowler's solution of arsenic is the preparation most approved of. It is best to commence with the small dose of three drops, to be taken three times a day in a glass of water; or it may be deemed advisable to use the decoctions of dulcamara, mezereon, or of sarsaparilla as a vehicle, as Dr. Duffin recommends. The dose must not be raised beyond eight drops three times a day, or at the very highest ten. When it first affects the system, the pulse becomes quickened, smaller, and hard; and there arises a prickly soreness about the eyelids, accompanied by some puffy swelling, particularly of the lower one. The gastric symptoms which are the signals for suspending its exhibition, are, sickness of the stomach, griping pains all over the abdomen, headach and whitish tongue, with a peculiar taste in the mouth. When there comes on a pain in the chest, accompanied with anxiety of the præcordia, and a certain consciousness of serious constitutional disturbance, which is indicated by uncommon gravity of the countenance, the medicine has been either given in too large doses or continued too long. When the pain in the chest and any of the latter symptoms occur shortly after its commencement, it is probably a case which will not bear its administration at all, and other means should at once be substituted. It will generally be found that an impression has been made on the disease when its effects are recognised in the constitution, and often before this. At first the patches become

* A Treatise of Diseases incident to the Skin, by Daniel Turner, of the College of Physicians, London, 3d edit. 1726, p. 30, et seq.

less indolent, and a long-unaccustomed sensation of heat and activity is felt; the scales first clear off in the centre, (for in those inveterate cases the whole patch is overgrown with scales;) by degrees the circular eminences sink and clean; and thus a disease which had become engrafted on the habit for years, retires under the influence of this powerful medicine.

[Of late, a solution of arseniate of soda, the iodide of arsenic, and an iodide of arsenic and mercury, under the form of the liquor arsenici et hydrargyri iodidi, or "*Donovan's solution*," as it has been called from its proposer, have been used with advantage.]

Some of the favourable symptoms ought to show themselves by the time that the medicine has affected the pulse, or when the stiffness and puffiness are perceptible under the eyelids. If the skin do not discover its action when these characteristic signs appear, there is no necessity, —indeed it would be improper,—to continue its use. In others, nausea and loss of appetite, with some epigastric soreness and oppression, are the first signs of its operation; but we should not consider these latter symptoms as unequivocal reasons for laying aside its use altogether; a few days' intermission will often remove this gastric disorder, when a further trial may be made; and it has frequently happened that the good effects have begun to show themselves soon after its being resumed. But in deciding how far it may be pushed, the discretion and tact of the practitioner must guide him: we only wish to lay down as a principle that the arsenic is not so unsafe a means in judicious hands as it has been vulgarly thought; and that after its use is commenced, ill-grounded fears should not deprive the patient of the steady trial of a remedy which experience has proved to be so valuable. Dr. Duffin states that he has prescribed it in very near four hundred cases, and has never yet seen it do any mischief; and his testimony and that of M. Biett, (two gentlemen who have investigated its effects the most assiduously amongst modern observers,) agree that it is a most important remedy in this intractable discase.

The tincture of cantharides is another very energetic medicine in lepra. It was brought into notice by the eulogy of Mead, although it is nearly certain that it was against the tubercular elephantiasis that he employed it. (Medical Works of Richard Mead, M. D. Dublin, 1767; of the Leprosy, p. 455.) However that may be, it has been used ever since in the scaly disease, and it has been found of great effect, particularly of late years. It is applicable in the same invetcrate description of cases as the arsenic, and requires quite as much caution in its administration. Four or five drops three times a day should be the utmost dose for the first month of its use, and at the same time the patient should use demulcent drinks of gruel, barley-water, flax-seed tea, &c. When given at an improper stage, or in too large a dose, it is very prone to produce serious disturbances in the alimentary canal and the genito-urinary organs, so that when we perceive painful heat at the epigastrium, vomiting and purging, or stranguary and erections to follow its use, it must of course be intermitted; but unless these symptoms show an unusual degree of violence, it may be often advantageously resumed. By a cautious gradation of the dose, (very small at first,) and the use of the demulcent drinks, with an occasional dose of purgative medicine, those sinister consequences may in general be avoided.

In some remarks on the use of tincture of cantharides in hooping-cough by Dr. Graves, in the fourth number of the Dublin Journal of Medical and Chemical Science, Dr. G. states that it produces its good effects without causing urinary irritation when given in the formula recommended by Dr. Beatty, which we here subjoin:—R Tinct. cinchonæ compositæ ℥v; tinct. cantharidis; tinct. opii camphoræ, āā ℥ss. M. There is nothing in the other ingredients of this mixture which should preclude its trial in lepra; and it would be very desirable if this combination would allow of its free use, by averting its ill effects on the urinary organs. Bateman's disparaging notice of cantharides kept it out of use for some time; but its value has been confirmed by the experience of the Hôpital St. Louis, where it is esteemed as only second to arsenic in the chronic cases. Where either of these two remedies is found to create constitutional disorder forbidding its continuance, it may advantageously be replaced by the other: but we repeat, to derive good effects from either of them, the greatest care must be taken to use them in the proper stages; for if they be given whilst any activity of inflammatory action remains, instead of benefit we must only expect to aggravate the whole disease.

A course of purgatives is at the present time a favourite practice in the less severe cases of lepra with some French practitioners, who speak with much applause of the good effects of calomel, jalap, sulphate of magnesia, and of soda, aloes, &c. in its removal. We rather suspect that this may arise from the novel introduction of cathartics into their practice, and the reaction in their favour which naturally follows on the apprehension and horror they had of this valuable class of medicines up to a recent period. It is, doubtless, of the highest importance to keep the bowels free by the occasional use of laxatives; and for this purpose a few grains of calomel will be generally found the most suitable. Much purging, however, as far as our experience goes, is decidedly injurious, excepting probably in children, where we can have recourse to scarcely any other class of remedies, and where purgatives answer very safely and conveniently.

The external and internal means of treatment have been noticed separately for the sake of arrangement, but in practice they are almost always employed together; and, when judiciously combined, they mutually assist each other's action. The tepid bath may be used in almost every plan of treatment, and will be found a useful adjunct. In those cases which have not spread extensively nor lasted long, the treatment should be commenced by an abstraction of blood, which is to be repeated either generally or by leeches, whenever the inflammation shows any signs of having resumed an active state: at the same time the patient should use some one of the internal remedies, and probably daily the bath. With those it will be

often judged advisable to apply some of the unguents or lotions already mentioned, so as to conjoin the operation of the different classes of remedies; and it is in such cases that this combination is most effective. In the inveterate cases, our reliance must be placed in the steady use of the internal medicines. We can go no farther on these points; each particular case will doubtless present its peculiarities, which must be considered. Having adverted to the most approved principles, and mentioned the remedies whose virtues have been best confirmed by experience, it remains for the judgment of the practitioner to guide him in each particular instance in the application of the former, and the choice and conjunction of the latter.

[A thorough change of the diet and regimen to which the patient has been accustomed, as well as of all the influences surrounding him, by travelling, is advisable, whenever it is practicable; and this has been, perhaps, the main agency, when a visit to sulphurous springs has effected a cure in rebellious cases: at the same time, as before remarked, the sulphur has doubtless been an important adjunct.] J. Houghton.

LEUCORRHŒA, from λευκὸς, *albus*, and ῥέω, *fluo*. Properly, this name ought to be restricted to a *white vaginal discharge*, but every sort of discharge, not sanguineous or menstrual, has been at various times considered as leucorrhœa, whether mucous, serous, purulent, or of a mixed description.

Besides "*leucorrhœa*" and "*vaginal discharge*," this complaint has been called "*fluor albus*," "*fluor muliebris*," "*les fleurs blanches*," "*sexual weakness*," or "*a weakness*," and, vulgarly, "*the whites*." All these are more or less objectionable, and the one chosen for the title of this article as much so as any other; but it is one which is so well known and universal, that it can scarcely lead to error in practice, and is, therefore, the most convenient. It would, no doubt, be very useful in practice to discriminate between the different discharges, because very frequently their character will depend upon, and therefore be a guide to the knowledge of, the nature of the disease which produces them, or the particular part which has become disordered or disorganized. Sir Charles M. Clarke has classed the diseases of the female genital organs by the nature of the vaginal discharges which are peculiar to them; and although there are many serious objections to such a mode of classification, yet it proves how important it is to note their several and distinguishing peculiarities. Of the diseases to which females are liable, there is none more common than vaginal discharge, of one sort or another; it attends most of the uterine diseases, and it is extremely common as the result of either local or constitutional disturbance, or of general debility. It is looked upon by the patients themselves as the cause of ill health, or of the symptoms under which they may happen to labour; whereas, in the majority of instances, the discharge itself can only be considered as a symptom, the effect and result of local or general disorder. By practitioners in general, vaginal discharges have been carelessly attended to; there has been one common routine of treatment, without investigation; and it is only when the complaint has been obstinate, that at a later period more minute inquiry has been made, and more rational and scientific plans adopted. So many of the vaginal discharges depend upon uterine disorganization, or some alteration in the position of that organ, that it is advisable in every case, where possible, to make a minute examination *per vaginam*, so as to ascertain the exact condition. It is foreign to this article to enter upon the question of the numerous uterine diseases which give rise to vaginal discharges; we must here only consider idiopathic leucorrhœa, a simple vaginal discharge, unconnected with any alteration of structure.

The simplest form of leucorrhœa is a mere increase of the natural secretion from the mucous membrane of the vagina. As this membrane is continued to the interior of the uterus and the fallopian tubes, it is easy to suppose that now and then the lining of these organs may become affected, and the leucorrhœa have a more extensive seat. Frank has mentioned a case of unusual obstinacy, where, after death, the fallopian tubes were found to be the origin of the disorder; and numerous cases are on record, where, in prolapsus uteri, the leucorrhœal discharge was found to proceed from the os uteri itself. By many of the older writers, it was thought to be merely a variety of menstrual discharge, and hence the term "menstrua alba," &c. Hoffmann, Cullen, and others, considered that the discharge issued from the same vessels which secreted the menstrual fluid in their healthy condition. Dr. Jewel, in his recent work on this disease, states his impression to be, that it seldom issues from the uterine cavity, and proposes a test to ascertain that point in individual cases. Dr. Jewel assumes, that in the night-time, when in bed, the discharge from the interior of the uterus is suspended, which is not the case when it arises only from the vagina or the cervix uteri; and hence he advises that a piece of sponge be introduced into the vagina at bed-time, and if the uterus only is affected, the sponge will be withdrawn *dry* in the morning. The accuracy of this test must depend upon the assumption being correct.

[When it takes place from the uterus, it occurs, according to M. C. A. Tott, (Art. *Leucorrhœa*, in Most's *Encyclopäd. der gesammten Medicin. und Chirurgisch. Praxis*, Leipz., 1836,) more intermittently, and is accompanied by clots of blood and mucus, or by pain in the uterus. It, moreover, augments before and after each menstrual period, and is accompanied by more constitutional suffering.]

This is, however, by far the most common form of the complaint, which takes place from the vagina alone, or, perhaps, as this gentleman states, from the cervix uteri. There is an altered action of the mucous lining of the parts, and in what that particularly consists, depends the peculiarity of the cases. It has been by far too common to consider all such cases as arising from debility, local as well as constitutional, and hence the remedies have most frequently been merely strengthening. In general, we shall find great symptoms of debility accompanying long-continued leucorrhœa, but the debility is nearly always the consequence and not the cause of the disease. It is the acknowledged fact, that whenever the general health

has been broken down, and much constitutional weakness occasioned, local disorder is often the result, and such disorder may attack the uterine organs or vaginal passage, though it is not debility which affects them, but through debility a diseased action arises. This diseased action is sometimes acute inflammation; in others, and more commonly, sub-acute; whilst, in chronic cases of long standing, a relaxed condition of the secretion apparatus may take place from habit, as we see in the diseased discharges from other sources; this Dr. Dewees has called the "leucorrhœa of habit." Besides inflammatory action, a very large proportion of cases of leucorrhœa depend apparently upon irritation, different from inflammation, and yet easily running on into it—a state easily recognised, but difficult to be described. The irritation which excites leucorrhœa is very often remote from the vaginal membrane itself, so that, upon alleviating or removing the distant irritating cause, the complaint will cease.

The discharge of simple leucorrhœa is mucous—merely an increase of the natural moisture of the part; it becomes more abundant than in health, but retains its character of mucus, being clear, transparent, colourless, and glutinous to the touch. This rarely goes on to a great extent without being altered in its appearance, and much more watery. In general, this sort of discharge is accompanied with but moderate symptoms, is more gradual in its progress, and is unattended by pain; there is little or no inflammatory action present. [It has, indeed, in moderation, according to Dr. Simpson, (Tweedie's *Library of Medicine*, iii. 314,) been regarded as an indication of the general vigour and activity of the organs of generation.] In other cases, the discharge is whitish and opaque, becoming creamy when rubbed between the fingers, and rendering water turbid. This sort of discharge has been considered by Sir C. M. Clarke, and others, to depend chiefly on an inflamed condition of the cervix uteri; it is rarely abundant, but occasions much disorder of health, and local pain. A watery discharge, resembling serum, is a very common result of more acute inflammatory action in the mucous surface, and in general appears suddenly, as the effect of cold or any active excitement. It occasionally becomes very abundant, is attended with much local heat and soreness, and soon becomes puriform, or mixed with purulent matter, and sometimes with bloody streaks. When it is fetid, brown, or coming away in violent gushes, organic disease of the uterus is to be feared, the nature of which can only be detected by an examination per vaginam. Purulent discharge from inflammatory action may also take place from the vagina, independent of gonorrhœa from impure connection; and this may be said to form one variety of leucorrhœa, as, although it may often arise from organic disease of the uterus, it is not unfrequently met with in a perfectly healthy condition of that organ. Many will hesitate, perhaps, to class either the watery or the purulent discharge under the term leucorrhœa; but it is quite certain that all the above-mentioned discharges arise from the mucous surface of the vagina alone, without organic disease, and solely from a diseased condition of the natural secretion of the part.

Patients, in general, content themselves with stating the existence of a weakness; and too many medical men are satisfied with such a slight description, and neglect to inform themselves more accurately of the nature of the discharge.

The symptoms vary, as will be supposed, and there is a marked connection, in general, between the symptoms and the character of the discharge.

The mildest form of the disease is often of long standing before a practitioner is consulted: it is generally found that it has been preceded by what is called "delicate health." The countenance is pale and sallow; the frame weak; the pulse feeble, and easily quickened by the least exertion; the appetite impaired or capricious: the spirits are languid, and exercise is taken with difficulty; menstruation is either scanty, or too profuse; the digestion is disordered, and the bowels are irregular: there is pain in the back when the individual is fatigued, or when she remains long in the erect posture; but it is a pain of debility, relieved by rest, and not permanent. The discharge, which has been referred to weakness, is a disordered action of the mucous membrane, and is the effect of a state of indifferent health. The discharge, in these cases, is mucous only; is never very abundant, and is unattended by local pain, except in the back. It may easily be altered in character, and then the symptoms are also changed; as in such cases a very slight cause will increase the disordered local action.

The most acute form of leucorrhœa is most commonly the effect of cold, of metastatis, or of some local, irritating cause, and consists of a profuse watery or purulent discharge, accompanied with local soreness and pain. The vagina is hot, very tender to the touch; there is much fever, heat of skin, quickness of pulse: these symptoms being often preceded by a distinct rigor. When the discharge is more scanty and glairy, like the white of an egg, or creamy and opaque, the cervix uteri is considered to be principally affected, and may be felt by the finger to be hot and tumid, the pulsation of the minute arteries being easily distinguished. In these cases there is much pain of the back, extending round the hips and down the thighs, and, though relieved, not removed by the recumbent posture. This description of leucorrhœa may occur in the most debilitated or in the most healthy frames, and may be considered accidental. All of these forms may end in chronic leucorrhœa, where the discharge is more or less profuse and constant, mucous or purulent, or a mixture of both: it may become green and offensive, and yet be the result only of functional disorder. The quantity poured out is sometimes very abundant, even to the extent of a pint and a half in the twenty-four hours; it will then be expelled in gushes on any change of posture. There is in these cases a very relaxed vagina, often accompanied by prolapsus of the uterus: the mucous surface appears smooth and glossy, and has lost its natural rugæ; there is great emaciation and debility: the eyes are hollow; the face pale or chlorotic; the pulse feeble and rapid; the feet often anasareous; the respiration short and laboured, to which succeed palpitation of the heart, dragging pain in the back, inability to exertion, profuse nocturnal perspirations. Unless

remedial measures be successful, after a protracted scene of much general suffering, the patient dies, exhausted.

The causes of leucorrhœa are either those which induce inflammation of the parts or irritation, or which weaken the action of the secreting vessels, although by far too much stress was formerly laid upon the latter. Catching cold, as it is commonly termed, is a very frequent cause of the acute leucorrhœa; so also is metastasis of a discharge from some other part, though of a different character. The suppression of the menses, the repelling of milk in the breasts, the sudden checking of catarrh, and perhaps any sudden check to the perspiration, may be considered as causes of acute leucorrhœa: a severe labour, in which the vagina has been kept long upon the stretch, or where it has been injured by officious manual interference, or the use of instruments, will often cause the inflammatory leucorrhœa. Violent exercise, particularly dancing, or riding on horseback, the excessive use of venery, or pollution, have the same effect. Of the irritating causes, we may mention local displacements of the uterus, especially prolapsus; local tumours of the vagina or uterus, and, of the latter, polypus in particular; stone in the bladder, disease of the urethra, a loaded state of the rectum, the presence of hard scybala, or of ascarides. A pregnant uterus may act in this manner, and also by the increased local determination of blood which pregnancy produces. The impaction of a pessary, or of a piece of sponge introduced for other purposes into the vagina, has sometimes been the unsuspected cause of a long-standing leucorrhœa. [Hence, it is all-important, in obstinate cases, to make an examination *per vaginam*.] Of the debilitating causes, may be mentioned frequent child-bearing, repeated abortions, profuse menstruation, and, in general, all the usual tendencies to disordered health, such as hot rooms, luxurious habits, indolence, poverty of living, protracted lactation, over-exertion, &c.

Treatment.—It is in this point that the greatest errors have prevailed, from the disposition to follow carelessly an established routine. Astringent tonics—bark and acid for instance, are prescribed in the majority of cases, and perhaps an astringent injection, which would aggravate many of the forms of leucorrhœa we have been mentioning. The plan of treatment ought to be regulated solely by the character of the complaint. It must be recollected that it is not always safe to check suddenly a long-standing leucorrhœa, if profuse. Many instances are on record of mischief resulting from such a course, and the following case is a striking illustration. We were consulted by a soldier's widow, several years ago, for a complete prolapsus of the uterus, produced by violent exertion during the retreat from Corunna, within a few days of her confinement, and which had never been reduced. There was profuse semi-purulent discharge from the inverted vagina. After some difficulty, the uterus was replaced within the pelvis, and a pessary worn, consisting of sponge soaked in an astringent lotion. The discharge from the vagina ceased; and in twenty-four hours a quantity of muco-purulent fluid began to be copiously expectorated from the bronchial membrane, which amounted, after a few days, to nearly three pints in the twenty-four hours: and, in less than a fortnight from the replacement of the uterus, the patient sank from exhaustion.

In the leucorrhœa from constitutional debility or disordered health, of the first class described, the usual remedies for restoring the vigour of the frame are required. Tonics of every description are admissible, according to the circumstances of the case; but those containing or combined with the mineral acids have most efficacy. The vegetable bitters, or the sulphate of quinine or the bark itself, may be given three times a-day, combined with from ten to twenty drops of the diluted sulphuric acid, or double that quantity of the old vitriolic elixir. From one to two grains of the sulphate of zinc, or any of the preparations of iron, will often agree exceedingly well, and as the health improves, the discharge becomes less and less abundant; the diet should be nourishing, the air good and occasionally changed. Besides these remedies, the shower-bath or cold bathing may be used, and especially hip-bathing, or sponging the back and loins freely with cold vinegar and water or salt water. Local remedies are rarely required in these milder cases. In the acute form of the complaint, it is often necessary to apply leeches to the neighbourhood, to the groins, labia, or back; and if the cervix uteri is particularly affected, to the os uteri itself, by means of a proper tube. This is much more easily effected than is supposed, and the liability of the leech remaining at the lower end of the tube instead of crawling up to fasten upon the uterus, may be prevented by inserting a piston to push the leech higher up the tube. Bleeding from the arm is rarely necessary, though in plethoric habits it may now and then be desirable. A low diet, perfect rest, and antiphlogistic general treatment are necessary; the bowels should be kept fairly open with saline purgatives or castor oil, avoiding aloes, scammony, or others of a drastic character; warm hip-bathing is very useful, and injections into the vagina of warm water, decoction of poppies, or solutions of the super-acetate of lead. Dr. Jewel advises, very confidently, weak solutions of the nitrate of silver as injections, in the proportion of one to three grains of the salt to an ounce of distilled water, or even the application of the caustic itself to the cervix uteri. We doubt, however, whether this treatment is applicable to this very acute form of the disease.

When more chronic, when there may be said to be subacute inflammation only present, or perhaps only irritation, the general health must be attended to, according to the nature of the general symptoms; but in such cases the greatest benefit will arise from local treatment, or from remedies more especially directed to the local mischief. It is this form of the disease which is most obstinate, and for which it is advantageous to possess a variety of remedial measures. Of the internal medicines which have been found serviceable, the balsams, particularly the copaiba, have been mentioned; but their efficacy is not nearly so marked as in the gleet or gonorrhœa of the male: the cubebs has also much about the same remedial powers. The cicuta has been found of service by some practitioners. The tincture of cantharides has been perhaps more successful, pushed to

as large a dose as can be borne without producing irritation of the bladder. Astringent medicines are also found occasionally serviceable, particularly the mineral acids with the infusion of roses and alum; the latter may be given in doses of from five to twenty grains three times a-day. The acetate of lead has been often successful, catechu, kino, uva ursi, powder of galls, which may be given in large doses. At the Lock Hospital, Mr. R. B. Walker is in the habit of giving ten to twenty grains of the latter in decoction of tormentilla. Dr. Copland recommends small doses of the sulphate of copper. Emetics are said to have been of use, but perhaps in the more acute form of the complaint. The local remedies, however, are most to be depended upon in these cases, and may be applied freely and several times a-day, either by means of the female syringe, or of a piece of sponge or lint introduced carefully into the vagina, and occasionally withdrawn for a fresh supply of lotion. Most of the female syringes are too small, and produce irritation by the frequent necessity for withdrawing the pipe for the purpose of refilling the instrument. The writer has been in the habit of obviating the inconvenience by a gum-elastic tube of three to four inches in length, and about half an inch in diameter, perforated with several holes at the apex, which is rounded off, and the tube made to fit to the stomach or lavement pumps, which are now so common: in this way any quantity of fluid may be injected into the vagina without withdrawing the tube. The applications may be classed into the irritating, the sedative, and the simple astringent; and as a general rule, it may be stated that the first are most applicable to the chronic states of subacute inflammation, rousing the vessels into a more healthy action. These consist of solutions of nitrate of silver (as just mentioned), of the sulphate of copper, of oxymuriate of mercury, &c.; inunctions of mercurial ointment, fumigations of cinnabar, or the local application of copaiba or turpentine. Dr. Jewel limits his lotions to the strength of three grains to an ounce of water, preferring the application of the lunar caustic itself to a stronger solution; but at the Lock Hospital, solutions of the strength of half a drachm, or even two scruples to the ounce, are not unfrequently employed. [Dr. Huston, of Philadelphia, has seen more advantage from injections of the oil of turpentine, than from any other: *Ol. Tereb.* f.ʒi. *mucilag. Acaciæ*, aquæ āā f.ʒiss.] The sedative injections consist of decoction of poppies, of solutions of opium or belladonna, and of the superacetate of lead, the last being by far the most efficacious. The writer is in the habit of using the common Goulard's extract in the proportion of two or three drachms to the pint of distilled or rain water, warm or cold according to the sensations of the patient, and he prefers as much as half a pint to a pint to be used at a time, three or four times a day. The sedative lotions are most serviceable where there is an acrid discharge, with heat and excoriation, or where there is much inflammatory action with local pain. In some severe cases he has seen benefit from introducing a piece of lint soaked in a liniment consisting of equal parts of Goulard's extract, Battley's laudanum, and mucilage. The astringent injections are applicable to the cases which appear to be attended by great relaxation of the vagina and its mucous membrane, with chronic discharge of a muco-purulent or simply thin mucous character. All the vegetable astringents are then occasionally serviceable, as well as the mineral. Alum, the sulphate of zinc, iron, or copper; the acetate of zinc; decoctions or infusions of oak-bark, galls, green tea, kino, catechu, rose-leaves, &c., may be alternately used, or some may be combined together; but a great deal depends upon their being used freely and frequently. In using astringent injections, particularly alum, it is advisable to wash out the vagina directly afterwards with cold water, as the discharge will sometimes become coagulated, and, remaining in the vagina, produce irritation and an increase of the symptoms. Leucorrhœa has been said now and then to be owing to want of cleanliness, and no doubt this may cause it, but it would be difficult to prove that no other cause existed. The remedy is obvious.

When there is reason to believe that the leucorrhœa depends upon a loaded state of the rectum or the presence of ascarides, a soap or a turpentine clyster will readily remove both cause and effect. In the leucorrhœa of pregnancy, more caution is to be observed. In the early months it is desirable to check it, as an excess of it will be very likely to bring on abortion; but it must be done gradually, and the lead injections are the safest. Where the discharge arises principally from the uterus, conception rarely takes place; and when it has occurred, the ovum is easily separated by the slightest causes, so that extreme quiet is always necessary for the first few weeks. In the latter months of pregnancy, leucorrhœa may be looked upon rather as a relief, unless excessive; the pressure of the gravid uterus and the greater determination of blood to the neighbourhood frequently producing symptoms of heat, weight, and discomfort, which are alleviated by the escape of the discharge. Rest and cooling laxatives, with a spare diet, are generally all that will be required.

[Uterine leucorrhœa is by no means as much benefited by astringent injections as the vaginal. It would appear, indeed, that, at times, they cause great irritation, and an aggravation of the local distress. The acute form requires cupping on the loins, with the hip-bath, and warm emollient injections into the vagina and rectum; and, after the active stage has passed away—or at any time, in the chronic form—counter-irritants may be applied to the sacrum, as the ointment of tartrate of antimony and potassa, croton oil, or dry cups. If a blister be applied, it ought not to be kept on too long, and its surface should be covered with tissue-paper, to prevent, if possible, the absorption of the flies or of their active principle. The same internal remedies, directed to the special pathological condition of the frame, are needed as in vaginal leucorrhœa. Of late, it has been affirmed that ergot has succeeded where other remedies had failed, in both the uterine and vaginal variety. It may be given in the dose of five grains three times a day.]

Very young children are liable to leucorrhœa. It occasionally occurs in infants shortly after birth; in these cases it is more or less purulent, and at-

tended by a redness and tumefaction of the orifice of the vagina. It is very apt to occur also during dentition, and not only when the first set of teeth are in progress, but at the time of the second set, and even when the dentes sapientiæ are irritating the system at a more mature age. Young girls are also sometimes affected with leucorrhœa, attended with debility, disordered health, and pain in the back. This usually arises from intestinal irritation or from gravel, though probably the latter may be equally the effect of the visceral disorder. It must be borne in mind that the appearances above described are not unfrequently the effects of improper habits. The curative measures are simple; the portion of the vagina affected is usually very limited, generally near the external orifice, so that the Goulard lotion is readily and effectually applied. Alkalies and gentle purgatives with a mild diet and rest, will in most cases be sufficient to remove the complaint. An epidemic vaginal catarrh has occasionally existed, as mentioned by Professor Capuron to have prevailed in Paris. It has also been observed in this country among children, but attended by much local inflammation and constitutional disturbance of a typhoid character, and which, unless treated very early, has ended in ulceration, sloughing of the pudenda, and death. These cases have been described by Dr. Percival of Manchester, as having occurred there in 1791. Again, in 1815, the attention of the profession was called to them by Mr. Kinder Wood, who had then seen twelve of them, all occurring at Oldham, or the immediate neighbourhood of Manchester. Dr. Mackintosh, of Edinburgh, has described four cases, of which two followed immediately after measles; and it is not uncommon to find a milder sort of leucorrhœa making its appearance after the subsidence of that eruptive disease. Except those mentioned by Dr. Mackintosh, it is curious that nearly all the others have been noticed in the neighbourhood of Manchester; for Dr. Ferriar, who practised there also, states, in his "Medical Histories and Reflections," that he had "met with several instances" of a similar nature. The cases related by Dr. Percival are important on another ground, as the first instance which fell under his notice led to the committal of a youth for a supposed rape, the appearances on the pudenda of the child having led to the suspicion that violence had been committed. The rapid occurrence of several similar cases alone saved the youth from trial and probably execution. The recollection of such facts is of real consequence when an opinion is required upon supposed instances of defloration.

There is one material point connected with cases of leucorrhœa, and especially those where the discharge is purulent or of an acrid character. In such instances it is well known that sexual intercourse will often bring on a train of symptoms very much resembling gonorrhœa in the male. This, when occurring between husband and wife, has often led to much domestic unhappiness, from the supposition of one party or the other having contracted gonorrhœa from impure connection. It is important to be able to distinguish between gonorrhœa and common leucorrhœa to remove or confirm the suspicions, but it is very doubtful whether any very accurate diagnosis can be formed. It has been stated that in a recent gonorrhœa there is ardor urinæ, which does not accompany leucorrhœa, unless unusually acrid. But how are we to distinguish in a case of this unusually acrid leucorrhœa, or where a gonorrhœa is not recent? The redness and tumefaction of the labia, nymphæ, &c. only can be seen in a recent gonorrhœa, and they may be seen in severe cases of leucorrhœa, particularly in those following local irritation, or possessing more acute inflammatory action. One other test is mentioned by authors, that in leucorrhœa the discharge ceases during menstruation, but does not in gonorrhœa. This, however, is denied by other authors, and, as Dr. Jewel observes, "this is a point which cannot easily be decided, as from the colour of the menstrual secretion, that of the leucorrhœal or gonorrhœal must necessarily be in a great measure obliterated." From what has been stated, it is quite evident that it is extremely difficult to distinguish between the two diseases, and particularly when we recollect how ready the party in fault will be to conceal or distort the facts. In all such cases it becomes the duty of the medical man to give his assistance not only in curing the disease, but in preserving domestic harmony.

C. Locock.

LICHEN, λειχήν. The cutaneous affection known formerly under this term was supposed to be, with several others, a mere modification or symptom of the lepra Græcorum (about which disease we have seen what confusion reigned—see Lepra); and we find that this improper notion was still held by writers at the beginning of the last century. It was also erroneously represented to be synonymous with impetigo. All this originated in its not being quite clear what was intended by the term λειχὴν in the Hippocratic writings, and in a misconception of Celsus. The latter describes under the name of *papulæ*, a form of cutaneous eruption which the best authorities consider to be the same as the λειχὴν of Hippocrates, and it is quite evident that he means a perfectly different disease by the term impetigo. Able commentators assert that the λειχῆνες of Hippocrates (Aphorism. sect. iii. aph. 20,) signify what they denominate "pustulæ siccæ,"—an expression which accords in sense with the papulæ of Celsus, and the same term (or pimple) which is adopted in modern nomenclature from the Roman author. Since the time of Willan, indeed, his application of lichen has been in universal acceptation, and it now always signifies an eruption of small, solid, reddish papulæ, which terminate with a scurf, and are very liable to recur.

The papulæ of lichen usually occur in adults, and are often connected with internal disorder, but not so exclusively as to be admitted into the definition: they are accompanied always with more or less pruritus, and are situated on the arms, face, or legs, and sometimes are developed all over the body.

But the closer description of the disease and its course requires that we notice its varieties; and here we may remark that we differ from those authors who deny the utility of entering into more minute distinctions than are necessary merely to denote the generic relations of the cutaneous affections. It is true that multiplying terms *use-*

lessly would only tend to embarrass the student of those diseases; but it is equally certain that classifying phenomena according to the various relations of form, colour, situation, extent, and other conditions, and thereby establishing *real* varieties, not only is highly conducive to the advancement of the pathology of those affections, but very much facilitates the attainment of a practical acquaintance with them. It appears to us to be as indispensable to the study as it is to the description of them, to have specified varieties fixed in the mind by distinctive appellations; and we confidently affirm that students who were really interested in acquiring a knowledge of skin-diseases have ever found material aid from the division into species accomplished by Willan. Their imperfections are, of course, manifold, but it is a proof of their utility to observe that every systematic writer, whatever his sentiments be with regard to them, whether he admire them or call for their abrogation, is obliged to notice them. The fact is, that they burden the memory of those only who make the vain endeavour to learn skin-diseases by books, while they assist in a very efficacious and pleasing manner the labours of the patient observer of nature.

The principal species, or rather varieties, of this affection are the following.

1. *Lichen Simplex.*—This is the species most commonly met with. It consists of small red papulæ, more or less elevated and acuminated, which contain no fluid of any kind, and are quite opaque and solid. It mostly commences on the face and the back of the hands, and, when more generally extended, it affects in preference the posterior and exterior parts of the arms and thighs. It may be stated generally, that it occurs most frequently in those parts of the skin which are most delicate and exposed to external influences. The eruption of papulæ is accompanied with a tingling formication, which is very disagreeable, particularly during the night, or when the person becomes heated by exercise or otherwise.

This variety is either acute or chronic in its course and character, but much oftener the latter.

In the *acute* form the papulæ are very red, and the inflammatory action accompanied with much heat and itching. After three or four days their redness diminishes, and having thrown off a minute furfuraceous scurf, they disappear. They are, however, at the same time followed by others. In about a fortnight after four or five successive eruptions, it generally subsides altogether. This acute form of the affection mostly occurs on the face and trunk.

The *chronic* form is generally situated on the limbs, and prefers, as before mentioned, the posterior and exterior surface of these. The papulæ have scarcely any inflammatory character, and the pruritus with which their manifestation is preceded or accompanied gives but trifling annoyance.—While some are sufficiently red, it requires that we pass the fingers over the great majority which stud the surface to distinguish them, so little do they differ from the rest of the skin in colour. The papulæ remain from a week to a fortnight, and leave the branny desquamation behind on waning; but the duration of the affection in the chronic form is quite indefinite, as fresh successive crops of pimples protract it often to many months. It manifests its tenacity sometimes by breaking out in a different part of the body after disappearing from its original situation, and it is liable to recur from the slightest cause, when the patient thinks that he is at length clear of it; such as changes of weather, errors in diet, or unusual exercise.

2. *Lichen circumscriptus.*—This variety is distinguished by a marked peculiarity of form. The papulæ, which in the former species are scattered without order, assume in this a circular arrangement. At the first view nothing may be observed beyond a ring of red papulæ, but on closer inspection these are found to inclose areas covered with a minute farinaceous desquamation, which is detached from small papular eminences beneath. The external papulæ alone manifest any inflammatory redness, or if those inside the circles differ from the rest of the skin in colour, it is only by a light pinkish hue. The circumferences of these circles, at first so small that the papulæ lie clustered in contact, soon spread by new eruptions, while the old borders fall into the desquamating centres. They seldom enlarge beyond the size of a shilling, and when the eruption is extensive, they mingle their circumferences, yet not so intimately but that it is always easy to recognise their circular form. This variety occurs as frequently on the trunk and face as on the extremities. From its tendency to spread and to propagate by forming new patches, it is not to be speedily eradicated. We have observed it occurring most frequently in early youth: it is called by boys at school *wildfire.*

3. *Lichen pilaris.*—This differs from the *lichen simplex* probably in no pathological character save that the papulæ are developed at the root of the hairs, which perforate their centres. This variety is remarked to be more chronic in its duration, and to be accompanied with greater irritability of the skin, than any of the preceding. Bateman's observation accounts for this: he states that it is often connected with derangement of the digestive organs, produced by ardent spirits.

4. *Lichen lividus.*—This is a kind which almost always occurs in persons with constitutions broken up by misery and privation. It consists in dark violet pimples scattered here and there on the legs and thighs; they are flat and broad, and are generally mixed with specks, which differ in nothing from purpura, to which disease this form of lichen is evidently allied. It is not so rare as some authors assert, but it is of little importance in a medical point of view, as in most cases its cure is to be promoted rather by the charity than the professional services of the physician.

5. *Lichen agrius.*—This is the severest form of this disease, as its name implies. (Ἀγριὸς, *ferus, agrestis.*) The papulæ are smaller than in the lichen simplex; they occur in congregated masses, and are very numerous. Their colour is deep red, and the skin where they arise is affected with a vivid erythematous inflammation, which spreads between them and beyond them. The heat or pruritus which accompanies their eruption is of the most violent character, and often deprives the patient, night after night, of rest: he cannot avoid scratching the pimples, and often employs a hard brush for this purpose. This pro-

ceeding, although rendered irresistible by the intolerable burning and itching, only tends to make matters worse; it aggravates the inflammation, and encourages the development of new patches. Besides this, where the papulæ become forcibly abraded, small ulcerations ensue, and a liquid oozes from them which forms thin crusts or scaly concretions. In some rare cases the affection appears to be relieved by the discharge, and having soon thrown off the soft incrustation which the latter formed, the cutaneous inflammation and its effects subside. The general course of the disease is, however, very different; painful exacerbations and new eruptions take place for many weeks; and at length it falls into a chronic condition, in which the inflammation nearly ceases, and the pruritus becomes much mitigated. In this condition it remains for an indefinite period, the serous secretion being checked, and the scaly crusts becoming dry, and diminished to a farinaceous exfoliation. After a severe attack of this affection the skin remains for a long time thickened and rough, and retains a morbid sensibility, which persists for a considerable space.

This aggravated form of lichen is sometimes produced from the lichen simplex by causes, general or local, which determine a higher inflammatory action. In such a case the inconsiderable itching which accompanied the pimples of the original species is changed into a burning pruritus; the papulæ become in some places apparently confluent, and surrounded with a deep red inflammatory areola; and thus it proceeds in the course described. It more generally, however, commences as a distinct form, putting on its characteristic severity from the very beginning. In that state where the lymphy fluid which exudes from the abraded and ulcerated papulæ concretes into crusts, it approaches very nearly to the character of eczema. If it persist without showing any tendency to heal, after some time a purulent secretion forms, and may become, as Celsus remarked, really converted into impetigo.

The situation of this species is uncertain. It occurs with about equal frequency on the face, trunk, and extremities. It is not peculiar to any period of life, as it happens at all times from childhood to old age; but it appears to be more frequently and easily excited in those vitiated habits of body produced by addiction to spirituous liquors. This is more particularly the case among the poor, who, in addition to the injury done by the drinking itself to their organization, deprive themselves of a wholesome nutrition to indulge this miserable propensity. It is always preceded or accompanied by some fever and gastric derangement, sometimes of a serious nature; such as headach, nausea, vomiting, and loss of appetite, also general soreness and pains. Internal disorder is also very apt to occur if the eruption be repelled by the unseasonable application of cold.

6. *Lichen urticatus.*—This is a variety which well deserves to be separately specified. It consists of an eruption of large red papulæ, like the wheals produced by the stinging of nettles. They are found on the neck and arms of young persons, and those of a delicate skin, in spring and summer. It disappears with a slight exfoliation after a short time, and recurs again generally several times before it is finally removed. The pruritus which accompanies it is not of the acrimonious character of the last species, but it gives considerable annoyance, particularly at night, when it also is accompanied by a slight feverish access.

M. Biett describes a variety distinguished from any other by the papulæ displaying a spiral or circularly twisting arrangement. He has given it the name of *lichen gyratus.* (*Cazenave et Schedel,* Maladies de la Peau d'après M. Biett, p. 269.)

Lichen tropicus is a species which appears to differ in no respect from the other varieties except in the rapidity of its invasion, and the greater intensity of the itching, which are caused by the high activity of the cutaneous action, and the general exaltation of sensibility which the solar heat gives rise to in the torrid zone. It is appropriately called the "prickly heat" in the tropical countries. "The sensations arising from it," says Dr. James Johnson, "are perfectly indescribable, being compounded of pricking, itching, tingling, and many other feelings." It is usually, but not invariably, accompanied by an eruption of vivid red pimples, not larger in general than a pin's head, which spread over the breast, arms, thighs, neck, and occasionally along the forehead, close to the hair. This eruption often disappears in a great measure when the patient is sitting quiet and the skin is cool; but no sooner does he use any exercise that brings out perspiration, or swallow any warm or stimulating fluid, such as tea, soup, or wine, than the pimples become elevated, and but too sensibly felt. As would be anticipated, the new comers are much more liable to this unpleasant affection than natives or long residents; for the susceptibility of the skin is greater, while the contrast between the cold and hot climate is still sensibly present; but even natives are not exempt from it. The fears which Hillary and Mosely express about dangers accruing to the patient from repulsion of the eruption by cold bathing are ungrounded; but Dr. Johnson states "that the cold bath rather aggravated than appeased the eruption and tingling, especially during the glow which succeeded the immersion." "The only means," says he, "which I ever saw productive of any good effect till the constitution got assimilated to the climate, were light clothing, temperance in eating and drinking, avoiding all exercise in the heat of the day, open bowels, and, last not least, a determined resolution to resist, with stoical apathy, (the temptation to scratch,) its first attacks." Mr. Plumbe remarks with justice, "that the prickly heat is not confined to the climates from which it derives its name. In fact, the lichen *urticatus* occasionally occurs in these countries with an intensity of itching and tingling that must be quite as tormenting as the tropical affection. The writer knew a person who for several successive nights was obliged to jump out of bed from the sudden supervention of an intolerable heat and itching, produced by an eruption of this nature. The pimples which arose on the head in particular produced such irritation, that the patient felt as if they would make him mad. After remaining in the cool air for a while, and taking a draught of water, they subsided, and allowed him to go to sleep at an advanced period of the night, leaving him quite free till the next night. It is often

brought on in spring and autumn, in young persons, by violent exercise, and it is a penalty not unfrequently paid for dancing in these seasons. Mr. Plumbe mentions a case where a public performer was obliged to forego this manner of obtaining a livelihood from the severity of its attacks. (Practical Treatise on Diseases of the Skin, p. 251, third edition, 1832.)

Diagnosis.—To some of the foregoing varieties may be referred every example of lichen; but these papular eruptions are so manifold, and pass so readily into one another, that it may be difficult to assign its proper place to individual cases: this, it will be conceived, is not of essential importance. Although we have adopted this division into species because we are convinced of its convenience and exactness, and think that it tends to forward the study of cutaneous pathology, yet it is not intended to impose a notion on the student that we derive at present much assistance from them in the treatment. Their diversity consists, at least chiefly, in the degree of inflammatory action, and is much influenced by the previous constitution of the person, their circumstances and habits, local relations, &c. The causes which produce them afford, also, a proof of their agreement. They may be comprised under two general heads:—1st. Heat, either of the atmosphere or artificial. This is a common source of them, from the slightest summer rash (lichen simplex) to the prickly heat. Blacksmiths and glasshousemen are very constantly affected by some form of it, from the heat of their furnace and forge. 2d. Derangement of the digestive organs, either from improper diet and spirituous liquors in excess, or defective and unwholesome aliment. To this head are often to be traced cases of lichen agrius, lichen urticatus, and to the latter cause particularly the lividus.

An accurate diagnosis of lichen is not always easily made. It is of considerable importance in practice, however, to be able to distinguish it, more indeed for the sake of determining what it is not, than for establishing its own identity. We must be particularly cautious not to confound it with any of the exanthematous eruptions, with measles or scarlatina for instance; but it is only necessary to point out here the possibility of this mistake: if the description of the varieties above given be fixed in the mind, it cannot occur.

From scabies, prurigo, and eczema, the lichen simplex is not so easily distinguished. We will observe, in drawing the distinction, that scabies comes out in vesicles which discharge a fluid on breaking, that it occupies the intervals, between the fingers, and the flexures of the wrist and finger phalanges; on the other hand the solid red papulæ of lichen are very different from the transparent vesicle of scabies; they are situated, as we have seen, on the exterior parts of the arms and thighs; and if they appear on the hands, where scabies almost universally begins, they occupy the dorsal surface, and do not affect the joints or the intervals of the fingers. The contagion of scabies would settle the question if this were ascertained, but this is never the case where there is a doubt as to the diagnosis. It is, in fact, to procure information as to the contagious nature of the eruption under consideration that diagnostic marks are valuable between scabies and lichen, in order that proper precautions may be taken, in case it be the former, to prevent it spreading. Lorry sums up the difference between them with conciseness and accuracy. "Primo a scabie differunt, quod papulæ illæ (lichenis scil.) vulgo magis confertæ sint et clatiores; 2°. quod rubicundæ magis et minus aridæ sint; 3°. quod sanatis febribus superveniant; 4°. quod latiores sint, et sæpius recidivam patiantur quam vera et legitima scabies; 5°. quod in furfur abeant notabile; 6°. demum quod remediis sanentur a scabiei curatione alienis." (Bateman's Synopsis, *note*, p. 8.)

The papular nature of prurigo comes nearer the external character of lichen simplex, but the pimples of the former are larger, much more separated, and seldom differing in colour from the surrounding skin; they are not acuminated as in lichen, and are covered generally with a speck of dark blood: this is produced by abrasion in scratching, the pruritus being of a peculiarly acrimonious nature; whereas in lichen simplex it is comparatively mild. Lichen may simulate eczema so closely as to require much tact and consideration to decide between them. When the eruption of lichen simplex is very vivid, there often appear, here and there, some vesicles; and when with this occurrence it happens that the patient abrades the summits of the papulæ, the excoriations give out a fluid which concretes and forms soft crusts; in this state many of the features of eczema are present. On inquiry it will be ascertained that at first the eruption was entirely papular, and that the few stray vesicles are merely adventitious. They generally come out after the excoriations have been made, and in their immediate neighbourhood.

The lichen agrius is still more difficult to distinguish from eczema. We must rely on the history of the eruption, and the character of the elevation of the skin, which is vesicular in the latter case, and papular in the former. This can generally be determined by examination after the crust which covers it is removed. Besides this, the irritation which the real eczema causes is strongly contrasted with the burning itching of the papular eruption; but this distinction may fail after a long duration of the latter disease, and the others become so confounded, that it is often impossible to distinguish between them.

It has been already stated that lichen agrius sometimes takes the characters of impetigo, but the reverse never takes place; the latter ought never to be mistaken for the former. The small psydracious pustules of impetigo are manifest from the beginning, and the coarse crusts which form on their breaking are different from the thin layer which the excoriations of lichen furnish.

When lichen agrius subsides into a very chronic state with a tendency towards cure it is often so much overlaid with furfuraceous exfoliation as to be taken for a scaly disease. Some authors, indeed, assert that it is not uncommon for it and for the lichen simplex to be converted into psoriasis. The writer has lately seen a gentleman who had on the arms and chest an eruption of lichen simplex, which in the axillæ and the folds of the buttock was changed in character so as to resemble ptyriasis more than any other cutaneous affection.

Lichen circumscriptus has often been mistaken for herpes circinnatus; we have lately seen a skilful observer make this oversight. It is to be borne in mind that the circular patches of the papular eruption are smaller, and show no vestiges of vesicles or their remains, which are always discernible on closely inspecting the rings of herpes circinnatus. Moreover the central space of the latter is quite untouched, but in the lichen the papulæ are still recognised, paler than the external circle, and overlaid with the farinaceous scurf. It is proper to remark that the psoriasis guttata has been also mistaken for lichen circumscriptus.

The difference between lichen urticatus and urticaria will be ever easily recognised by any one that has seen both affections. Besides the exanthematous character of the latter, the form is quite distinct. The papulæ in the lichen are large, elevated, distinct, and are more or less permanent. The wheals of nettle-rash are confluent, flat, and scarcely ever remain beyond a few hours at a time. This lichen may also be mistaken for the venereal eruption called by some authors lichen syphiliticus. The latter disease is marked by its coppery hue; besides it is destitute of the pruritus which accompanies all proper lichens, and it is more steadily persistent than lichen urticatus. Again, it is seldom found alone, almost invariably accompanied by some of the other attendants on secondary syphilis.

Prognosis.—In none of its varieties can lichen be considered as a dangerous disease, and in the less scarce forms almost the only importance that attaches to its presence is the troublesome itching which the pimples occasion. When it arises from merely local or temporary causes, such as the directly irritating action of the spring or summer heat, it is of little consequence and of short duration; but if its origin be more deeply seated in the constitution, if it be liable to frequent recurrence and exacerbation, it leads to more unpleasant consequences. It is in such instances that it gives rise, after a long duration, to a thickened rugous state of the skin, which completely obstructs its function of exhalation. At other times, as we have before stated, under similar circumstances it becomes complicated with eczema and impetigo, and, according to Biett, sometimes degenerates into ecthyma. The lichen agrius, as it is the most severe of all the varieties, so is it also the most difficult of cure; when situated in the face, it more particularly resists with uncommon obstinacy all therapeutic means. It may be stated as a general rule, that this and the other varieties are difficult of removal in proportion as they are of long duration.

Treatment.—In the lighter forms of this eruption, the treatment is simple. It demands, indeed, but little interference from the physician. His services here are seldom required further than in making an accurate diagnosis, tracing the eruption to its true cause, and laying down principles of treatment. As they generally occur in warm weather, and depend more or less on it, the individual should keep the house for some time, and thus abstract himself from the direct heat of the sun and from exercise, which last is one of the most common exciting causes of it. It will be useful to employ every day towards evening the tepid bath. Some even prefer the cold bath; the warm bath is too stimulating to the skin. To coincide with these cooling means, it will be requisite to adopt a diet in which the allowance of animal food is diminished. It will rarely be necessary to inhibit it altogether, but the greater proportion that vegetable and farinaceous matters make in the meals the better. Wine and spirituous drinks should be laid aside, but there is no objection to a moderate quantity of table-beer. As to medicines, it will be sufficient to give a saline laxative occasionally, so as to keep the bowels open: sometimes it will be judicious to use a few grains of calomel or blue pill for this purpose; potions of lemonade are much used in France. Bateman extols the use of dilute sulphuric acid where a grateful tonic is called for. For allaying the itching, various topical applications have been used. Mucilaginous decoctions, as that of marshmallows, are said to have a soothing effect. A lotion with two drachms of prussic acid to a pint of water has been also recommended highly. We believe that one of the best applications for this purpose is milk of almonds, in the composition of which a few bitter almonds have been mixed; with this the skin should be gently moistened three times a-day, or whenever the pruritus become troublesome.

In some of the acute cases where a good deal of fever accompanies the eruption, or where much sympathy is evinced in the digestive organs by vomiting, loss of appetite, or pain in the head, it will be highly advisable to take away some blood from the arm, and to pursue a more decidedly antiphlogistic plan. Stimulating applications, such as sulphur fumigations, or ointments with camphor, &c. are not to be used in the acute forms; but when much of the activity of the eruption is subsided, and the harsh chronic state of the skin, mentioned before, supervenes, then baths of the sulphuret of potash or of the sulphureous mineral waters will be very proper. In this state the ointment of the proto-ioduret of mercury, mentioned in the article Lepra, has been used with decided benefit.

In lichen agrius it is advisable to commence the treatment almost always by a venesection. Nothing tends so much to allay the vehemence of the burning pruritus. This practice will be more pointedly indicated if the patient be young and vigorous, but we consider that it is not less useful in an opposite condition. The application of leeches in the neighbourhood of the inflamed papulæ will also prove a very effectual sedative for the painful itching, but in their use it must be carefully observed to place them exterior to the inflammatory area. Every thing said with respect to the necessity of an antiphlogistic diet is still more indispensable to observe here while any fever remains, or while the inflammation displays any activity. Under these conditions, every local stimulant must be avoided as worse than useless. Emollient poultices, with some Goulard's extract sprinkled in them, will sometimes be found to assuage the irritation, but if used more than barely lukewarm, they will only increase it. The almond-milk embrocation will answer this end probably as well as any other. Dr. Elliotson recommends, as the best means for allaying the tingling and itching,

a lotion of chloride of lime or soda, to be used very dilute.

If under depletory means the eruption loses much of its intensity, then the exhibition of tonics will often prove highly serviceable. The decoction of cinchona with sulphuric acid is preferable to any other. This is especially useful in the cases of broken-down, dissipated subjects, and where the constitution has been brought rather low by antiphlogistic measures. It is not to be imagined that there is any thing contradictory in this practice of first reducing the system by depletory means, and then administering tonics as it were to restore it; on the contrary, the practice is found not only compatible with theory, but experimentally good. In fact, where we have to do with impaired constitutions, the abstraction of blood will be useful, as the tonics will act with greater certainty and efficacy after it, than if they be trusted to without it. With respect to the diet in this stage of the affection, it should be still kept of a very light kind; but it is to be borne in mind, that where the disease has supervened in an individual whose digestive organs and system generally have been greatly impaired by habitual drinking, it is expedient to allow him a small portion of his accustomed stimulus. This is another fact confirmed by experience and reconcileable to pathological principles.

Where it has fallen into an inveterately chronic state, lichen is a very intractable malady. Sulphur fumigations, sulphur and alkaline lotions, have in this case been found beneficial. Mercurial preparations have also been recommended. If obliged to have recourse to this mineral, we would prefer trying the proto-ioduret of mercury to any other preparation, from what is known of its effects in some other cases; one grain twice a-day is a sufficient dose for an adult. With its internal use, might be properly joined the local application of the ointment of the same preparation. We believe, however, that Fowler's arsenical solution is the best internal remedy in those inveterate cases; it is to be given in doses of from three to eight drops thrice a-day, and continued for at least a month. The cautions usual in its exhibition are of course to be strictly observed.

J. Houghton.

LIVER, DISEASES OF.—The liver, in common with other organs, is liable to certain morbid changes of structure, usually designated "organic disease." The application, however, of the epithet "organic," has been neither very precise nor correct; for it is used to express every description of alteration, from simple congestive tumefaction to complete disorganization or alteration of structure or tissue. In the present [general] article, we propose to consider the diseases of the liver (hepatitis excepted) [which will follow in a distinct article] and its membranes, and the general effects of them upon the economy at large. Many of these are purely the effects of inflammatory action of some kind; many the result of morbid growths or accretions, and present morbid changes of structure, induced by causes the nature and operation of which are not satisfactorily ascertained. These affections may be arranged under two general heads or divisions, namely, those affecting the investing membrane, and those affecting the more immediate substance of the liver.

I. Diseases affecting the Investing Membrane of the Liver.

The diseases affecting the investing membrane of the liver are mostly the result of inflammatory action. Inflammation, when confined to the membrane, is generally also confined to the anterior or convex covering. Sometimes, however, it occupies those portions in contact with the stomach and duodenum. The effect is a layer of coagulable lymph. This layer gradually concretes, becomes more or less organized, and firmly attaches the peritoneal covering of the liver to the contiguous parts, producing what are termed "adhesions." In some cases, the adhesions are so generally diffused over the whole surface, and the contiguous membranes so closely united, as to seem one simple but thickened membrane, nor can the separation be effected without sufficient violence to lacerate the original membranes, and separate them from their natural connections. More frequently, however, these adhesions are formed by membranes of considerable length, in many instances resembling the processes known more commonly as "the ligaments of the liver." The substance of these adventitious membranes varies in different cases; in some, it is extremely delicate, pellucid, transparent, and beautifully interwoven. In others, it is much denser and firmer, and frequently crossed or intersected with strong, inelastic, ligamentous-like bands. The author has now in his possession a membranous connection of this sort, about five inches in depth, and which is traversed on each side by strong unyielding bands of this description, several lines in thickness.

In many cases the membranes present no appearance of unusual vascularity; but it not unfrequently happens that the whole surface is covered with minute vessels, intersecting each other in every possible direction. These vessels are sometimes of a bright vermilion, sometimes of a purple colour. In such cases, these adventitious membranes are in a state of inflammation, and give rise to all the local symptoms of severe inflammation of the contiguous viscus, without the constitutional excitement so invariably accompanying a true phlegmasia. It may be as well to explain the nature of symptoms which frequently prove embarrassing to the practitioner.

These connecting membranes, being of foreign origin and the production of disease, are not so intimately connected with the system as those which are more immediately and essentially parts of the natural organization, and exert no direct influence upon the animal economy. Consequently, when diseased or inflamed, they become mechanical sources of impediment, rather than causes of constitutional derangement. Like all other organized parts, they exhibit sensibility and all the other manifestations of vitality, but still the sensibility is probably much inferior to that of the essential organizations; or, at all events, from their loose connections, and the total absence of all functional contribution, they do not appear capable of influencing the economy, like the other parts, more intimately connected, when labouring under disease. It is obvious that the treatment

will consist in mere local measures, such as leeching, cupping with scarification, blistering, &c. Dry cupping is often very efficacious in such cases.

Sometimes the coats of the liver are converted into cartilage. Dr. Baillie, however, states that this happens much more frequently in the spleen than in the liver. The cartilaginous conversion is generally smooth, thin, and soft in its texture. Sometimes small fat-like excrescences are observed upon the surface of the peritoneal covering. They vary in size, from that of a pin's head to that of a pea. They often partake of the character of tuberculous accretions, and their consistence varies from a mere pulp to a hard fatty mass. They are not important in a practical point of view.

II. Diseases of the Liver.

The diseases of the liver may be divided into those affecting its immediate structure and those affecting its appendages.

Morbid Anatomy of Diseases of Structure.—A very common effect of previous disorder is preternatural evolution of volume from simple tumefaction. It is the consequence of an unnatural accumulation of blood in the vessels of the liver. It is that condition described by the French writers under the term **hyperæmia,** and may be either general, that is, pervading or occupying uniformly the entire of the organ, or more partial in its extent. When general, the liver presents a degree of redness uniformly diffused throughout. Its volume is considerably enlarged, but of the natural consistence; and its absolute weight, as well as specific gravity, is increased.

If an incision be made into a liver in this condition, black fluid flows out very abundantly. It often happens, however, that the hyperæmia is more partial, appearing in distinct patches, and forming red spots, varying both in figure and extent, in different parts of the liver. These spots are rendered more conspicuous from the contrast presented by the surrounding paler parenchyma. The colour arising from hyperæmia will vary according to circumstances. In some instances it assumes a dull brick red; but in most cases it is of a reddish purple, which is readily reconcilable with the sources of supply.

Andral asserts that hyperæmia is of three kinds. The first he considers as arising from irritation, which may be either idiopathic or sympathetic of—"subsequent to"—a similar affection of the alimentary tube. The second description he considers to be wholly of a passive nature, the blood accumulating in the parenchyma, exactly as it accumulates in the gums in scurvy. The third kind he looks upon as purely mechanical, arising from obstruction of some description or other in the right side of the heart; "the blood then stagnates in the supra-hepatic veins, and obstructs the liver." (Vol. ii. p. 588.)

The same authority asserts that "congestion of the liver from a mechanical cause" often takes place in infants during parturition. Such infants have the liver so gorged with blood, that the vessels give way, and the blood is extravasated under the investing membranes on the anterior or convex surface. M. Billard states that effusions of blood into the cavity of the abdomen, in consequence of such a turgid condition of the liver, are by no means uncommon.

Hyperæmia may be considered as comprehending several distinct varieties, differing as to their seat and nature. It may take place, for example, in the larger vessels, producing that species of plethora more properly designated *engorgement.* In this species the larger arteries and veins are preternaturally distended; and the flow of blood on section of the substance will be immense. It may also be complicated with a sub-inflammatory condition of the vessels, particularly of the veins.

When we consider the peculiar character of the circulation through the liver, and the nature of the vascular structure by which the function of the organ is performed, we can have no great difficulty in understanding the subacute character of the symptoms even of what may be termed the more active diseases of the organ. The function of the liver, contrary to that of most other organs, is performed through a venous rather than an arterial tissue; and hence almost all the diseases of the liver manifest the congestive or the veno-congestive character; that is, symptoms are either almost altogether absent, or they are of the more obtuse description. Very often in the congestive affections there is no obvious manifestation of disease, till the liver has acquired a volume incompatible with the space naturally assigned for its accommodation; and the attention of the patient is attracted, not by the primary affection, but by the secondary ones. But when the disease partakes of the nature of veno-congestive inflammation, then we find those subacute symptoms characteristic of this species of inflammatory action; such as dull pain, a slightly excited circulation, and the other symptoms of constitutional participation.

The inflammatory affections of the liver are always more slow in their course, and their terminations, unless by resolution, are more protracted. Hence suppuration, abscess, &c., are much longer deferred than in organs the structure of which renders them liable to real inflammation. Upon these principles we can understand, or at least plausibly account for, the utility of mercury in the early periods even of what are named inflammatory affections of the liver. They are all mostly of the congestive or veno-congestive character, and mercury seems to exert a specific exciting influence upon those parts of the vascular system which are more especially the seat of such congestions.

The structure of the liver is found to consist of two substances: one apparently formed by the ramifications of its capillary vessels, presenting a reddish appearance; the other a yellowish white, and which is supposed to be chiefly concerned in the secretion of the bile. Although these two substances are in the natural state distinct, yet some care is necessary to prevent their being confounded. In engorgement, however, they are not to be distinguished, and, consequently, a uniform redness—purply redness—pervades the entire viscus.

The blood sometimes escapes from the vessels, and is effused into the parenchyma, producing a species of bloody infiltration, named by the French writers *hepatic apoplexy.* Sometimes it arises from the rupture of a single, but large vessel, dis-

tributed in the liver. In other instances, there is no perceptible rupture of any of the vessels; but spots are perceived dispersed in various parts throughout the organ. These spots, on being examined, are found to consist of blood, either in the fluid state or coagulated. Andral relates an instance in which, besides various collections of fluid and semi-coagulated blood, there were found some spots of a firmer consistence, in the centre of which were several fragments of hardened fibrine, deprived of the colouring matter. The examination of this condition induced him to investigate the question, whether fibrine thus deprived of its colouring matter might not be the origin of certain accidental productions, encephaloid and others, frequently found in the liver; a conjecture in which he was confirmed by the examination of another liver, in which he was able to trace the different changes of the blood, from its perfectly fluid state till it passed into a substance resembling precisely the encephaloid in all its characters. (Vol. ii. p. 589.) Cruveilhier states that the first degree of hepatic phlebitis is often a circumscribed infiltration of blood into the tissue of the liver. (Dictionnaire de Médecine et de Chirurgie, t. viii. p. 326.)

Anæmia is a condition directly the reverse of the foregoing, in which the viscus does not receive its due proportion of blood. This, however, more frequently arises from some morbid condition of the organ diminishing or obliterating the calibre of its vessels, as induration and various other organic changes. If, for instance, the white substance of the liver be preternaturally developed, the red remaining either in its natural condition, or becoming altered in its colour, while its bulk diminishes as the red part wastes, it becomes less vascular; condensation takes place; it is converted into a species of cellulo-fibrous tissue, and the vessels are obliterated.

2. *Derangements of the nutritive functions.*— The process of nutrition and growth is subject to morbid derangements in the liver as well as in other organs; and in fact there are, perhaps, but few parts of the animal body in which such derangements are so frequent. They are not only very various in their nature, but give rise to various and frequently very opposite results.

Hypertrophy of the Liver is a condition in which its volume is increased. This condition may be confounded with simple hyperæmia, in which the bulk is also increased; but they are affections of a very different character, the one being a preternatural accumulation of blood in the vessels; in the other the increase of volume depending upon the preternatural development of substance.

The hypertrophy may be general, that is, the entire structure hypertrophied; or it may be partial, confined to particular portions of the structure. The organ, also, may present various appearances as regards colour, consistence, and form. It may be pale, or red, or of various other tints, as green, grey, or brown; this last in parts degenerating into complete black. The consistence may be either increased or diminished; it may be firmer and harder,—having a denser and more solid feel,—or it may be softer, and more approaching to flabby. If the hypertrophy be equally and uniformly diffused, the change of form will be simply enlargement. But in some instances the hypertrophy is partial, and one constituent may be hypertrophied, while the other remains in the natural state, or even runs into atrophy. This may give the liver "a lobulated, mamillated, or granular appearance." (*Andral.*)

Hypertrophy may also be considered in reference to extent. Thus it may occupy the whole of the liver, or only one or more of its lobes. When one lobe only is hypertrophied, it appears to constitute the entire of the organ, the remaining parts appearing more like appendages. When the right lobe is extensively hypertrophied, the left seems quite diminished, or to have nearly vanished. In the case of hypertrophy of the left lobe, the right seems to have diminished in size. The hypertrophy of the right lobe is sometimes such as to cause it to project considerably below the ribs, and in children sometimes to extend nearly to the ileum, occupying the whole lumbar region, and a great portion of the epigastrium. When the hypertrophy exists in the left lobe, it will often extend into the left hypochondrium, and not only may be, but has been, mistaken for an enlarged spleen. More frequently, however, it occupies the epigastrium, and the practitioner should be aware of this fact, because such projections, by careless or hasty observers, may be mistaken for gastric tumours, or for diseases of the transverse colon.

The lobulus Spigelii, it has been asserted, is found frequently enlarged. More modern observation, however, has not confirmed the assertion. It certainly is sometimes enlarged, but it does not appear that it is often found in a state of isolated enlargement.

According to Cruveilhier, a considerable development may arise from accidental productions found in the substance of the organ. But this is not hypertrophy properly so called. It is not uncommon, however, to observe such tumours accompanied with a true hypertrophy of the tissue of the liver itself; so that there is at the same time with adventitious tissues an augmentation of the proper substance of the organ. In other cases the liver is the seat of an extravasation, from which results a pure and simple augmentation of volume without any alteration in its substance. (Dict. &c. p. 326.)

In the fœtus, and for some time after birth, the liver maintains a volume very disproportionate to that which it subsequently preserves. As age advances, the size of the liver comparatively diminishes, and it appears much reduced; it is consequently retracted, or rather drawn upwards, and its edge can be no longer felt projecting below the margin of the ribs. This is the natural condition; but in some cases this natural reduction in volume is so far from occurring, that the growth increases, and the liver becomes still more disproportionately enlarged. Thus the hypertrophy may continue progressively after birth, or it may cease for a while; and the liver, after having retired nearly within its boundaries, will suddenly, and without any manifest cause, continue to increase, until it arrives at an incredible and most distressing size. This state of the liver is very often merely one of that combination of perver-

sions in the nutritive functions which together constitute the scrofulous diathesis.

Atrophy is the directly opposite condition of that just considered. Atrophy, though generally accompanied with reduction in volume, yet is not necessarily so. It may extend to all the lobes, or affect only one. Like the preceding condition, it may also be attended with induration or softening.

Though generally attended with a diminution of size, yet an augmentation of volume is by no means incompatible with an atrophied condition. Sometimes the size of the organ, though atrophied, exceeds the natural, and the atrophy consists in the removal of the proper tissue, cellular tissue being substituted in its stead. In these cases there is a defect in the organization, and the structure, as it were, reduced to its primitive frame-work, presents extensive patches of cellular tissue. This tissue is sometimes formed into serous, or contains hydatids, or it may become hypertrophied; which, it is argued, so far from implying an increase of organic action, rather indicates a deficiency; the tissue being unequal to the production of the true parenchyma, degenerates into a serous cyst. The atrophy may be partial, and then the glandular grains which have not been atrophied become enormously developed, to supply, as it were, the deficiency caused by those which have been removed.

Cruveilhier states that he has sought in vain in the vessels of the liver, whether arterial or venous, for the cause of the atrophy of the organ. They are diminished in a ratio directly proportioned to that of the liver, but nothing tends to show that this diminution has been a primary operation. (Loc. cit.)

Atrophy of the liver is observed in a great variety of circumstances. In some cases of retention of bile in consequence of the extreme distension of the hepatic ducts, the liver has been reduced to half its natural size. In indurations, too, it has appeared atrophied, so that its glandular structure was hardly to be recognised.

The partial atrophy seems in general to arise from pressure upon the liver, either by tumours found in the immediate neighbourhood of the organ, or from those formed in the substance of the viscus itself.

Induration.—This state may exist simply, or combined with hypertrophy or atrophy. The colour varies, being either a purple or lighter red, or grey olive or brown. On cutting into a liver in this condition we observe no peculiarity of structure, but it appears rather a confused and undefined mass. The surface of such livers not unfrequently presents the appearance of membranous threads, of a radiated figure, the lower edge bent a little forwards. Baillie considered this the first step in the formation of the common tubercular liver. He observes, "I have sometimes seen very small tubercles formed upon a part of the surface of such a liver, which were exactly of the common sort. From this appearance it is probable that additional matter is deposited in the interstices, through the general mass of the liver, rendering it much harder, and that this matter, together perhaps with part of the ordinary structure of the liver, is converted into tubercles." (Morbid Anatomy, c. ix. Diseased Appearances of the Liver.)

Cruveilhier has often found indurated livers of a green olive colour, of great density, tearing or giving way with extreme difficulty, and of a volume less than in the natural state. The glands appear atrophied, and the fibrous envelope of each granulation thickened. In place of bile, the biliary vessels contained a kind of serosity tinged of a bright yellow. In a patient who died, after a tedious green jaundice, in a manner similar to those who died of cancer in the liver, the only alteration discoverable on dissection was that above described. By far the greater proportion of indurations of the liver are accompanied with a diminution of its volume.

Softening.—This condition is said to be as common as the foregoing, which, however, does not accord with the writer's experience, at least among the troops; still it must be allowed that softening is a very frequent morbid condition. There seem to be two degrees of it: in the one the softened consistence is not perceptible unless it be compressed between the fingers; it then readily gives way, becoming a kind of pultaceous mass.

In some cases the liver is so softened that it is impossible to detach it without tearing it into shreds; and when the peritoneal covering and proper investing membrane are broken, they reduce to a sort of brownish yellow pulp. This alteration has been looked upon as cadaveric, a view, however, which appears to be unfounded. The liver itself appears a kind of pulp deprived of every semblance of organization. It has no fetid odour. When put into water, an immense number of small yellowish granules appear. These are quite distinct, seem as if dissected, and resemble the small seeds which present in dried grapes or raisins, attached to the large vessels by vascular pedicles. In the other the softening appears evident to the eye, and somewhat resembling that acquired during long-continued maceration. The vessels, or at least the extreme branches, seem to float in a reddish or greyish-looking pulpy mass, and which seems to be nothing more than the dissolved parenchyma.

The colour is in some instances natural; if, however, there be hyperæmia, the colour will be purple or brown, but it frequently happens that in consequence of some modification of structure, the colouring matter of the blood cannot penetrate the tissue, and it appears remarkably pale. In such cases the only traces of blood are confined to the large vessels.

Baillie, under the head of softened substance of the liver, states that it is found much more flaccid than natural, without any other appearance of disease. It feels as soft as the spleen to the touch, and is then mostly of a leaden (q. v. purple) colour. This change he considers must arise from a process similar to what Hunter named "interstitial absorption," the absorbents removing insensibly the very minute parts of structure without ulceration. This state he looks upon as mostly confined to advanced age, being rarely, if ever, found in very young persons.

Tubercle of the Liver.—Baillie notices several forms of tubercle in the liver; such as

common tubercle of the liver, large white tubercle of the liver, soft brown tubercle, and scrofulous tubercles.

Common tubercle is confined to persons of middle or advanced age, being very seldom met with in young persons. It is likewise more common in men than in women, and more apt to occur in persons addicted to spirituous liquors. Baillie describes such tubercles as near each other, of a rounded form, and giving an appearance of irregularity to the surface. They consist of a brownish or yellowish white solid matter. They vary in size from that of a pin's head to that of a hazel-nut, some of them even exceeding this. The liver is in such cases indurated, and its lower edge bent a little forward. The liver itself is of the healthy size, or sometimes smaller, and on section of the substance the patulous vessels seem reduced in their calibre. The colour of the liver is yellow, which is attributed by Baillie to the accumulation of bile in its substance; and as this condition is almost uniformly accompanied with ascites, the fluid accumulated in the peritoneum is almost always tinged yellow, from mixture with bile. The gall-bladder is described as being much contracted and white, from being empty. The bile, it is asserted by the same authority, from the pressure of the hard liver upon the pori biliarii, does not reach the ductus hepaticus, and consequently cannot pass into the gall-bladder. Permanent jaundice is also established, because it depends upon an unchangeable morbid condition of liver. When the jaundice has continued for a considerable time, the blood in all the blood-vessels of the body is found either not coagulated at all, or very imperfectly so; and this is attributed to the chemical influence of a mixture of bile with the blood. This is the appearance of what is named "scirrhous liver;" but it bears only a remote similarity to scirrhus as it appears in other parts of the body. (Morbid Anatomy, c. ix.)

Large white tubercle of the liver.—Under this name Dr. Baillie describes hard white masses sometimes formed in the liver, varying in size, being in some cases considerably larger than a chesnut, and in others a good deal less. They are more numerous near the surface than in the middle of the substance. They are in clusters, with the healthy structure interposed; are of a firm consistence, and constituted of an opaque whitish substance; they are hollow, or depressed upon their outer surface; and the liver is generally enlarged.

This form seems to be generated round the blood-vessels, as appears from making sections. It may or may not be attended with ascites. Sometimes bile is accumulated, tinging the substance of the liver, the colour remaining natural between the tubercular masses. Dr. Baillie asserts that he has observed a sort of pus lodged in these tubercles very much resembling that from scrofulous sores; and he therefore concludes that this species may be of a scrofulous nature.

Soft brown tubercle.—These generally consist of a soft, smooth, brownish matter; are about the size of a walnut, and mostly occupy the surface of the liver. They are a rare form.

Scrofulous tubercles. Tubercles resembling those found in the lungs of scrofulous or phthisical patients, are said to be occasionally found in the liver. They are said to resemble them precisely, except in being a little browner in colour. They are dispersed and solitary, and do not give that irregularity of appearance attendant on the other forms.

The liver in children is frequently found in a tuberculated state. The tubercles are about the size of a millet-seed, hard and semi-transparent, so as to be sensible to touch as well as sight from their density, but yet would escape a careless observer.

Such are the forms and varieties of tubercle enumerated by Baillie; but there is reason to believe that the nature of these appearances was not thoroughly understood in the days of that highly distinguished anatomist.

It has been already observed that the structure of the liver consists of two distinct substances; the one a reddish purple, formed by the capillary ramifications; the other of a whitish or yellowish colour, and which seems to be the part which secretes the bile. In the natural state these two substances are distinct, but an excess of blood destroys all distinction. On the other hand, a deficiency of blood renders the yellow substance more distinct and evident; and the privation may be such that the reddish substance may be deprived altogether of colour, and the liver assume a whitish tinge throughout its entire substance.

This appearance may be very much modified as changes predominate in the texture of the parts forming the hepatic mass. The yellowish substance may become hypertrophied, and this admits of various degrees. In one kind the substance is marked by the transit of whitish lines; in the other it is granulated; and these granulations, whether isolated or agglomerated, assume the appearance of yellow wax. These granulations Laennec considered as an accidental (adventitious) tissue generated in the liver, and named it, from its colour and appearance, "*cirrhosis.*" He also asserts that what he terms cirrhosis is accompanied by a shrivelled state of the organ; and it is almost always accompanied by ascites. (See Baillie on the common tubercle of the liver.)

Cruveilhier, who has given an excellent plate of this condition, (Anatomie Pathologique du Corps Humain, 12e livraison, planche 1re,) has examined and described its minute anatomy very attentively and accurately. He found the liver reduced to about a third of its ordinary weight and volume: the right and left lobes nearly equal in size, but remarkably altered. This double character, diminution in volume and change, is a very constant occurrence in these affections. The tissue is also denser than is natural.

The surface of the liver is not smooth but roughened by a number of granulations (tubercles), between which there are depressions, wrinkles, and thickenings, and the organ might be said to be dried up, as it were, withered, its investing membranes irregularly thickened, and opaque in many parts. Cartilaginous laminæ were found upon the inferior surface of the left lobe, and which were part of the peritoneum.

The colour is yellow, varying from a bright or canary to a brown yellow, depending upon the

fluid with which the tubercles are penetrated. These tubercles, if squeezed upon white paper, tinge it yellow. The quantity of colouring matter, though various in the different tubercles, seemed in direct proportion to their size. The blood-vessels traversing the tissue were found healthy, but the blood which they contained was serous (watery); the biliary-ducts and the gall-bladder full of a yellow bile, more or less inspissated.

On removing the investing membrane, which was done in several places, the tubercles were found to differ in size; and some, of the size of large peas, had a number of others beside them of the size of millet-seeds; and this gave the irregularity of surface to the liver. Each tubercle was found to be perfectly distinct and unconnected with the neighbouring ones, was provided with its own proper membrane, and was connected with the liver only by a mere vascular pedicle.

On a section of the liver these observations were confirmed; that is, the separate existence of the tubercles and their colour. But farther, it demonstrated that there existed, independently of the tubercles, a very dense fibro-cellular tissue, altogether foreign to the natural state. A section of one of these tubercles, examined by the microscope, presented precisely the same characters as the section of a healthy liver, namely, a spongy tissue analogous to the pith of a rush.

On examining into the characters of these tubercles, they seem to be nothing more than an unnatural development of one structure at the expense of the other—"une dissociation des deux élémens naturels de cet organe: les masses jaunes, fauves, constituant le tissu accidentel appelé cyrrhose, ne sont autre que les granulations sécrétoires, se désorganisant graduellemen par l'effet de l'oblitération du lacis vasculaire, et l'obstacle à la circulation hépatique qui en resulte." (Mémoire par M. Bouillaud inseré parmi ccux de la Société Médicale d'Emulation, tom. ix. p. 170.) The examination also proved that nothing more is neccssary to give a tuberculated appearance to the liver than an unusual development of the acini, and hence it is unnecessary to suppose the production of a new tissue to account for the phenomenon.

[M. Cruveilhier, however, does not admit that the granules are formed of two distinct substances. His views of cirrhosis are, that it consists essentially in atrophy of the greater number of granulations, and hypertrophy of the remainder to supply the deficiency thus engendered. The two distinct substances in the liver—the yellow, the secreting tissue, and the red formed by ramifications of blood-vessels—are, however, by no means generally admitted, and until their existence is established, any theory founded upon them cannot be implicitly received. The views of Mr. Kiernan in regard to the minute anatomy of the liver (*Philosophical Transactions*, for 1833, p. 711, or the writer's *Human Physiology*, 5th edit. ii. 268, Philad. 1844) have given rise to another explanation which is considered by Dr. Carpenter (*Principles of Human Physiology*, § 659. Amer. edit. Philad. 1843) to be satisfactory. The small masses are regarded as uncongested patches, composed of parts of several adjoining lobules, and having one or more interlobular spaces as a centre; and the biliary plexus of these, being filled with bile, gives them their yellow colour. In the other, there is a more or less complete atrophy of the portions of the substance of the liver intervening between them, so that the size of the liver is much diminished. This may be the true explanation; but, as elsewhere remarked, (*Practice of Medicine*, 2d edit. i. 600, Philad. 1844,) the opinion of Laënnec has appeared to the author to be most entitled to favour; and the circumstance, that, in certain forms of cirrhosis, little granules, having the appearance of adipocire, can be washed out of their cellular fibrous capsules, after a maceration of some days in water, is greatly in favour of their adventitious formation. The matter, of which the rounded masses in cirrhosis consists, is not considered by Mr. Goodsir (*Lond. and Edinb. Monthly Jour. of Med. Science*, May, 1842) as a new deposit, but merely as the natural tissue of the liver, altered by the pressure exerted by its fibrous envelope. These alterations consist in constriction, more or less powerful, of the vessels and ducts which pass out of and into the rounded mass; the necessary difficulty with which the circulation is carried on, and the bile advanced along the ducts; and, latterly, in a change in the constitution of the nucleated cells themselves, which, instead of being distended with bile containing oil-like globules, contains matter of a darker colour than oil. The cells may at last contain matter perfectly black, and then the rounded mass assumes the appearance of a melanotic tubercle,—the black cells, in some instances, being pyriform and caudate. Mr. Goodsir does not state the exact nature of these various changes in the liver, although he is inclined to believe that the forms of cirrhosis and melanosis are due to the contractile tissue, as a product of inflammatory action more or less acute. His remarks on the whole subject can only be regarded, however, in the light of suggestions.]

Tubercles in the livers of adults are very rare, and Cruveilhier asserts that he never met with them in the numerous cases of pulmonary and abdominal phthisis which he has had occasion to examine.* He states that he has seen the liver of an individual full of tubercles, each formed by a dense cyst containing a drop of pus; at the same time there were a great number of calculi in the biliary passages. The small multilocular or unilocular cysts formed by the roots of the excretory biliary ducts are often confounded with and mistaken for tubercles, when containing small calculi, or a liquid tinged with the bile. Cruveilhier has very often met with this kind of alteration in both the livers of newly-born children and in adults.†

Erectile Tumours of the Liver.—Cruveilhier describes an affection of the liver in which the tumours resemble the tissue of the corpus cavernosum penis. They are very common not only in the liver but in other organs. Sometimes they are solitary, sometimes numerous. They appear to be formed of a greater or less mass of granulations, and are capable of an indefinite increase.

* "Les tubercules du foie sont très rare chez l'adulte; je ne les ai jamais rencontré dans les cas nombreux de phthisie pulmonaire, de phthisie abdominale, que j'ai eu occasion d'examiner." Dictionnaire de Médecine et de Chirurgie, tom. viii. p. 329.

† Ibid. p. 330.

In one instance, in the centre of the tumour there was a mass of fibrous tissue, from which prolongations extended, which in their growth passed in all directions. In another instance a carcinomatous tumour accompanied the erectile. (Dictionnaire de Médecine, &c. p. 330.)

Flaccid Liver with Reddish Tumours is a state noticed by Baillie, in which the liver is unusually flaccid, and studded with large reddish soft tumours, containing a thick pus. They were found in a person presenting the leading characters of the scrofulous diathesis. He considers them in some measure analogous to fungus hæmatodes.

Fatty Liver.—This is a condition more common in the lower animals than in man. While a fatty or adipose state of the other organs and the muscles in particular seems to be the last stage of atrophy in them, the same appears to be the last stage of hypertrophy in the liver. The fatty liver in the human subject never assumes that complete adipose transformation induced in the livers of geese, ducks, &c. by the agency of the most absolute rest or inactivity, darkness, and the artificial ingestion of an immense quantity of alimentary matter. The liver, however, in the human subject undergoes, to a limited extent, a true fatty transformation. The discoloured liver observed in cases of phthisis is frequently confounded with the true fatty transformation; but chemical analysis disproves this opinion, by showing that the fatty material does not exceed the proportion naturally belonging to the normal condition of the organ.

[Recently, Mr. Bowman has suggested, and Mr. Goodsir accords with him, that the fat in adiposis of the liver is deposited within the nucleated cells of the organ, and that the disease is to be considered, in part, as a redundancy of the oil-globules naturally existing in these cells, with atrophy of the other structures.]

Phlebitis of the Liver. — This affection is frequently a consequence of inflammation of some of the other veins. It frequently follows large wounds or surgical operations, and is thus not unfrequently an antecedent to traumatic abscess. Cruveilheir asserts that he has often induced it by the injection of irritating agents, into either the general venous system or into the vena portæ. (Dictionnaire de Médecine, p. 327.) The circumscribed inflammations of the liver consequent upon phlebitis present every degree from the red induration to the actual formation and collection of pus. It has also been caused by inflammation of the hæmorrhoidal veins. Thus Cruveilhier relates an instance in which long-continued, violent, but ineffectual efforts to reduce an old prolapsus ani produced so much irritation of the rectum, that inflammation of the hæmorrhoidal veins succeeded, which extended to the veins of the liver, and terminated in a number of abscesses, both superficial and deep-seated, in this organ. The phlebitis may be confined wholly to the capillary system, as it may at the same time occupy both the large veins and the capillaries.

Cysts are often observed in the liver, of which the causes are various.

Hydatids are very often seen in the liver, and are mostly contained in a cyst. The cyst is formed of dense, firm, unyielding material, something like leather or fibro-cartilage. It is generally laminated. The laminæ are composed of white matter; and the cavity is sometimes divided by a partition formed of the pulpy substance lining the laminæ. (*Baillie.*) The cyst may contain a single hydatid, or they may be numerous.

The hydatids are found loose in the cavity, and floating in a clear transparent fluid. They appear like small, rounded, sometimes oval-looking bags, which are said to consist of a white semi-opaque pulpy matter, containing a fluid capable of coagulation. (Ibid.) In an examination of a liver containing a cyst full of hydatids, which occupied more than three-fourths of its volume, leaving but a small portion of the right and left lobe free, the writer found the hydatids perfectly transparent and pellucid. In this case the liver was reduced in size, and the emaciation and contraction of the intestines were such that the bodies of the vertebræ could be distinctly felt through the abdomen, and counted. It might be almost truly said the peritoneum lining the interior muscles of the abdomen rested upon the bodies of the vertebræ.

In some cases the colour is of a lightish amber. The bag in which the hydatid is contained seems to consist of two laminæ, and to possess a contractile power. The larger hydatids are occasionally found to have smaller ones attached to them. In some cases the hydatids are connected, and even found to enclose each other like a set of pill-boxes; in other instances they are distinct and unconnected.

Hydatids are generally found occupying the substance of the liver, but occasionally they are attached merely to the outer surface, hanging pendulous into the cavity of the abdomen.

Cruveilhier (Planche v. troisième livraison,) describes a curious instance of ascites, anasarca, and icterus with "deux kystes acéphalocystes du foie." The patient, a man of thirty-eight years of age, and vigorous constitution, had been wounded, in 1814, in the epigastrium by a musket-shot. About the year 1828 he was troubled with vomitings, and with pains in the stomach, every fifteen days, and which had commenced about a year after his accident. He was bled, and leeches were applied, with other treatment. Scarifications were made on the extremities, subcutaneous inflammation followed, and he died comatose.

On opening the abdomen, instead of peritonitis, as was anticipated, nothing but a citron-colour fluid appeared. The liver presented a singular appearance. The antero-posterior diameter equalled the transverse and the vertical very nearly the same at the right as at the left extremity. The left lobe was atrophied, and the surface of the liver shrivelled, and roughened by granulations of unequal volume and differing in form. There were two large fluctuating tumours, one on the right and the other on the left. Superiorly they did not extend beyond the level of the organ; but inferiorly the left formed a kind of spheroidal bulging of considerable size. Both tumours presented superiorly a very bulging sort of appendix traversed by sanguineous vessels with very thin walls, and which would have soon burst into the peritoneal cavity. The cysts on being opened were found filled with a muddy yel

lowish fluid, in the midst of which were both entire and empty acephalocysts connected together and coloured yellow. On examining one in its perfect state there appeared some white points, like small grains of sand, more resisting than the other points, vulgarly but erroneously regarded as the germs or eggs of acephalocysts. The figures or shapes were very singular and varied, and which it is asserted the partisans of the vitality of these organized globules will refer to defects in the conformation arising from a straitened development. On examining the primary membrane lining the left cyst there were agglomerated tubercles roughening the internal surface, which might be compared to small eggs. In a portion from the right there were vesicles in clusters, some regular, some irregular, and which Cruveilhier thinks we should feel some difficulty in regarding as the germs of acephalocysts ready to detach themselves.

The enveloping cyst was fibrous and a quarter of a line in thickness. The internal surface rugous, as it were torn, and studded with concretions, in some places brown, in some green, in others yellow, and in some a most beautiful orange yellow; all which shades arise from the colouring matter of the bile some way modified. These concretions, which Cruveilhier asserts he has seen several times forming a thick lining or bed similar to biliary calculi, lining the entire of the cysts, prove evidently, he says, the communication, a temporary one at least, of the cyst with the biliary tubes or canals.

The cyst was easily detached; and a loose cellular filamentous tissue connected it with the liver, to the substance of which it was attached merely by a number of arterial and venous vessels and hepatic tubes, of which a great proportion was obliterated.

The cyst of the left lobe, which extended below the level of the liver, compressed the left division of the vena portæ, which was narrowed in an extraordinary degree, to which circumstance the atrophy of the left lobe in this case is attributed. The corresponding branch was on the contrary dilated.

On examining a portion of the liver by making incisions, it was found tuberculated, the tubercles separated by interspaces of different extent. In the interspaces the liver had a fibrous aspect, and did not present, in a given proportion, above half the glandular structure belonging to the natural state.

The subcutaneous phlegmonous inflammation with infiltrated pus, occupying the lower extremities and extending to the thighs, is considered by Cruveilhier to have been occasioned by the scarification of the anasarcous extremities, and to have been the cause of the succeeding coma, and ultimately of death.

Cysts containing an Earthy Matter have been found in the liver. They are generally formed of a kind of fibro-cartilaginous, dense, firm membrane. Sometimes it is partially ossified. The earthy matter is gritty, sometimes plastic, and of a whitish colour. It consists chiefly of phosphate of lime, and very probably is merely the commencement of osseous deposits in the substance of the liver.

Cysts containing Worms have been said to be found in the liver and likewise in the biliary ducts. Lieutaud relates instances of this sort, but they are very rare, and the fact seems even rather doubtful.

Rupture of the Liver is an injury to which it is exposed from external violence, and is an accident to which it is more liable than any other gland in the body. This greater liability Dr. Baillie attributes to two causes; first, its more exposed or rather less protected situation in thin persons, if the liver be enlarged; secondly, because its structure is such that it yields to external violence more readily than any of the others. The accidents from which such ruptures occur are heavy weights falling upon the abdomen or passing over it. The writer saw an instance of this sort at Chelmsford some years ago. A carter fell from his wagon, which was heavily laden, and the wheels passed over him in the region of the liver. He lived a very little time, but did not complain of much pain, except from the bruise. On opening the abdomen the cavity of the peritoneum contained an immense quantity of blood, the liver and spleen were ruptured, as was also the vena cava, from whence the hæmorrhage took place.

Traumatic Abscess of the Liver. — Abscesses after wounds, &c. are apt to form in different organs, but in none more frequently, after the lungs, than in the liver. These abscesses vary both in number and extent. Sometimes there exists but one, sometimes there are two or three small clusters. In some cases there is but a single abscess; and in an instance mentioned by Cruveilhier, of death in consequence of gangrenous inflammation of the pelvic cellular tissue, induced by infiltration of urine, on examination there was found but a single abscess in the liver, and seated in the loose cellular tissue which surrounded one of the divisions of the vena portæ. In other cases the liver presents an immense number of small spots or foci of a tubercular appearance.

On tracing these abscesses through their progress from their first formation, they appear at first as brownish bloody spots, which seem to be situated in the glandules themselves. 2. Infiltration of white concrete pus, which gives an appearance of granite to the liver, with a slate brown colour all round, without any other evident trace of inflammation. Sometimes a great number of the glandules are affected; in other cases it is limited to a very few, which with the density of the pus, the number of foci or clusters, and the irregularity of the masses affected, has given rise to the idea of their tubercular nature. The surface of the liver next the cluster always appears of a slate-brown colour, which is probably cadaveric. 3. A collection of pus of abscess, the dimensions of which exactly equal those of the masses first affected.

The causes of such abscesses are wounds of different kinds, surgical operations, and phlebitis. They seem to arise from the transmission of pus with the blood through the veins; a fact which accounts for the much greater liability of the lungs and liver to these kinds of abscess. The diagnosis is extremely difficult; sometimes there is pain in the right hypochondrium and right shoulder. In

other cases the region of the liver may be pressed upon it in every way without the slightest indication of sensibility. Jaundice is very uncertain. If, however, several days after a wound or surgical operation a patient should be seized with shivering, and suddenly sink into the extreme of a typhoid state, with no manifestation of disease in any of the other organs, a suspicion of the existence of this result may be entertained.

Abscesses sometimes, it is said, form in the liver in consequence of injuries done to the brain. This form is said to arise from irritation. The subject, though considered at some length by Cruveilhier and some other writers, requires further researches.

Melanosis.—The liver is liable to become melanotic. During the progress of the disease the liver sometimes enlarges to such an extent as to occupy nearly the whole of the abdomen, and in a female might be mistaken for pregnancy. A case of this kind is related by M. Ruyer in the Encyclographie des Sciences Médicales. The patient, a woman about thirty-three years of age, had enjoyed very good health till the month of June, 1833, about which time she was ill-treated by her husband, and in a very violent manner. He kicked her upon the chest and abdomen in several places, and several contusions were the consequence, which were wholly neglected. After some days, dull pains were felt in the region of the stomach, extending to the lumbar spine. In the course of a few days the pains disappeared without any treatment, reappearing however at uncertain intervals, with various degrees of severity, according to the exercise to which she was forced to subject herself. The abdomen at this period was of its natural size. In January, 1834, she was confined of a healthy child, which she suckled for eleven months. After confinement the belly diminished very little in size, and felt equally hard. She perceived that the abdomen enlarged, and she felt all the symptoms of pregnancy: she became much emaciated, and at last died. The abdomen was extremely hard and enlarged, and on opening it about three pints of a serous-looking fluid escaped. The liver filled up completely the whole of the abdomen, pressed the diaphragm high up into the thorax, extended into the right iliac region, and terminated by a protuberance of a spherical form. The entire structure was altered from the normal condition presenting a confused mass. Extensive adhesions existed between the anterior part of the stomach, a considerable portion of the transverse colon, and this hepatic degeneration. It pressed the whole of the intestines and other viscera against the vertebral column. It weighed twenty-four pounds. It was softer, more friable, and more easy of incision than in the normal state. It was of a violet brown slate colour, and studded with a number of whitish tumours, varying in size from that of a millet-seed to that of a hen's egg. The abscesses contained a homogeneous liquid of a purulent consistence. The gall-bladder was much enlarged; its contents almost black. The other abdominal viscera were natural. The vertical diameter of the thorax was reduced one-half; the heart of its usual volume, but displaced, its apex directed upwards; the lungs reduced in volume; their tissue soft, little crepitous, and easily torn; and there were numerous adhesions between them and the pleura costalis.

Cancer of the Liver.—The term cancer, as applied to diseased appearances in the liver, comprehends certain morbid productions deposited in its parenchyma. They are of different kinds, produce masses of various sizes and extent. They are mostly white, the white being sometimes mixed with red. Cruveilhier observes—"Of all the diseases of the liver, the most frequent and the most severe is, perhaps, the cancerous degeneration in the form of disseminated masses." They vary in extent, are somewhat spheroidal, and deposited in different parts of the substance of the liver, or near its surface in the midst of the perfectly healthy tissue, the organ appearing, as it were, filled with them. There is mostly a perfect line of demarcation between the tissue of these tumours and that of the liver, and the transition is abrupt, not gradual.

These tumours seldom appear solitary, that is, a single and only one, and in the few instances which Cruveilhier met with, upon close examination there existed a number of small miliary tumours, which from their tenuity would readily escape hasty observation. They vary in number from eight or ten to several hundreds or more.

These cancerous tumours are commonly confined to the surface. In a liver containing twenty tumours of this description, sixteen were found near the surface or superficial. (*Cruveilhier.*) The superficial ones are generally prominent, so that they can be felt through the abdominal parietes; and they may often be recognised by touch after the operation for ascites, frequently necessary in the advanced periods of this disease. But when they become large or extensive, they lose their spherical shape and become hollowed out or cupped in the centre, in consequence, probably, of the thickening of the corresponding cellular tissue under the peritoneum. The peritoneum itself often becomes thickened, fibrous, and cartilaginous; and adhesions take place between the liver and contiguous parts.

The situation in which the larger cancerous masses generally appear is the part which corresponds to the suspensory ligament, and consequently the antero-posterior ridge. Hence, perhaps, the reason why adhesions occur so frequently between the liver and stomach, and why these cancers open in the latter. The lobulus Spigelii is frequently affected, even throughout its entire substance, so as to appear a prominent encephaloid tumour. (*Cruveilhier.*)

These tumours also vary in size, from that of millet-seed to a turkey's egg, or the two fists, or even the head of a full-grown fœtus. From all the facts, their size, appearance, consistence, &c., it may be inferred that they are formed at different periods. There seem to be two varieties of them, which do not exclude each other; the hard or scirrhous, and the soft or encephaloid. These are generally considered but degrees of the same disease; but, according to Cruveilhier, this is incorrect, and the expressions, "period of crudity, period of softening," are improper.

The hard kind appears with an areolar web, which grates under the scalpel, composed of ex-

tremely dense, fibrous, and sometimes even cartilaginous meshes. It may be said that the tissue is fibrous, or even cartilaginous. There are small cavities in the centres of the tumours, filled with a fluid, crossed by fibrous bands more or less regular. On the pressure a lactescent cancerous juice exudes. If macerated in water or a weak solution of chlorine, the cancerous matter is dissolved, leaving a marginal fibrous tissue behind, somewhat analogous to the erectile. Sometimes the centres of the tumours are overrun by blood-vessels well developed; in others the vessels are so reduced in calibre, that it requires some attention to discover them. The soft kind is of a greyish white colour, resembling the infant brain. It is the encéphaloïde cancer of Bayle and Laennec. In some cases it is very white when not much overrun with blood-vessels, but where the vessels are numerous the quantity of blood gives it the character of apoplectic spots.

Ossification.—Bony depositions are sometimes found in the liver. The writer once met with a piece of bone imbedded in the substance, about the size and somewhat of the shape of the human patella. It resembled common bone, consisting almost entirely of phosphoric acid and lime, with a very small proportion of the carbonate of this earth. The upper surface rose very little above the level of the liver, and its entire depth or thickness was imbedded in the parenchyma.

Diseases of the appendages may be divided into those of the ducts and those of the gall-bladder.

Dilatation of the biliary ducts.—The cystic, the hepatic, and the ductus communis choledochus are liable to dilatation; mostly effected by large gall-stones making their passage through the duct, which sometimes is so far dilated as to measure an inch in diameter. (*Baillie.*)

Obliteration is frequently produced by inflammation, especially of the inner surface, terminating in adhesion. Hyperæmia of the mucous lining may cause such a swelling as will totally obstruct the passage of the duct, and this obstruction, however induced, may give rise to jaundice. Long-continued irritation may induce hypertrophy of the sides of the ducts, and produce an obliteration, the duct itself being transformed into a fibrous cord. Thickening and hardening of the duodenum or pancreas may, by compressing the ducts, obliterate them.

The gall-bladder is likewise subject to certain alterations; such are adhesions, ulcerations, thickening, and ossification.

Gall-stones are frequently found in the biliary ducts and in the gall-bladder. Sometimes the gall-bladder is completely filled with them, and then it is usually much enlarged. The number varies, but it is occasionally very great:* sometimes but one is found; it is generally very large; when numerous, they acquire different shapes from friction. The writer was furnished with two passed by a lady, which were flattened somewhat like a bean; the area about half as large again as a shilling, and much thicker than a bean. They were brown, smooth, and polished outside; sawn through they presented a bluish slate-coloured appearance; fracture rather striated; they consisted of phosphate of lime, trace of carbonate, and some animal matter. There was very little cholesterine in proportion to the other components. They were extremely hard.† These biliary concretions occupy all parts of the liver, the biliary ducts as well as the gall-bladder, and the larger ducts for the transmission of the bile. They produce frequently great irritation, inflammation of the mucous tissue, ultimately terminating in ulceration. In some cases the dilatation of the gall-ducts will allow them to pass into the intestines, and they are then voided by stool. Cruveilhier has given two very excellent plates illustrating the different situations and effects of these concretions upon the tissues.

Bile.—The bile, as might à priori be inferred, is liable to morbid changes, and it possibly might be presumed that the extent of these changes would in some degree correspond with the alterations in structure of the secretory organ. This, however, is far from being the case; and observation has been unable to establish any uniform connection between the alterations in the liver and the qualities of the bile. In many cases of severe organic disease of the liver, the bile appears to undergo little change; and the most obvious changes in the bile, and the most considerable augmentation in quantity, are sometimes accompanied by no recognisable change in the normal condition of the secreting organ. It is true we very often estimate the quantity secreted by a very uncertain scale, namely, the quantity discharged from the intestinal canal or the stomach in bilious diarrhœa and in cholera. Neither the quantity nor quality of the fluids secreted from the blood depend absolutely and essentially upon the normal conditions of the organic structure of the organs; and the experiments of Magendie have shown that the composition of the bile, and even its quantity, may be altered and increased at pleasure by changing the food of the animal.

Cholesterine.—Chevreul detected in human biliary calculi a peculiar crystalline matter, which he named cholesterine. Fourcroy considered it analogous to adipocire, and so named it; but Chevreul has shown that it is an independent principle. It is a brittle, lamellated, brilliant crystalline solid, somewhat like spermaceti in appearance, from which it differs by being infusible under 278° Fah., and in not being converted into soap by a solution of potass. It is devoid of taste and smell, and is insoluble in water. It dissolves in boiling alcohol, but is deposited on cooling in white pearly scales. According to Chevreul, its analysis yields—

Carbon	85.095
Hydrogen	11.880
Oxygen	3.025
	100.000

Nitric acid converts it into an acid, which has been named cholesteric acid, insoluble in water, but perfectly soluble in alcohol, especially if heated. Taste styptic, odour that of butter; lighter than water, and fusible at 136½° Fah. In quantity it is of an orange yellow tint, but eva-

* In Dr. Hunter's collection was an instance of above a thousand in one gall-bladder.

† As these calculi were voided by stool, their origin may seem somewhat doubtful.

porated spontaneously it is deposited from its solution in alcohol in white acicular crystals. It reddens litmus paper, and neutralizes the alkaline bases, and hence is an acid.

Cholesterine has been found in parts of the body wholly unconnected with the hepatic circulation, and from these facts it would seem to be a product of morbid vascular action under peculiar circumstances. Breschet found it in cancer of the intestines, and in the fluid of hydrocele and of ascites. Caventou found it in an abscess of the jaw, produced by a carious tooth. Christison found it in an osseous cyst of the kidneys, and in the membranes of the brain in epilepsy.

The bile of the human subject is liable to become diseased. In some cases, if tasted, it produces no other inconvenience than bitterness and a nauseous sensation; but in others, it will produce pustular affections, ulcers, and all the acridity which belongs to the most powerful agents of this class upon the tongue and lips. This must be owing to the bile having acquired some acrimonious properties, derived, no doubt, from certain morbid changes in its chemical constitution. The sensible changes exist in its colour and consistence: thus it presents every shade, from the deepest and most intense black to a nearly white tint. Its consistence is sometimes that of pure water; in other cases it is like pitch; and in others like glue or thick mucilage.

The chemical composition varies, as well as the relative quantity of the constituents. In some cases there is a considerable predominance of the resinous principle; in some there is an excess of the yellow, while in others the cholesterine is the superabundant principle. In some cases it has consisted almost entirely of albumen and water, and this has been observed more especially in connection with a fatty state of the liver. It may be observed generally, however, that little has been as yet ascertained as to the causes of these alterations. It is this alteration in the proportions of the constituents which gives rise to the formation of biliary calculi. They consist of the inspissated bile; of its resinous matter; of cholesterine; of picromel; and of the phosphates. Calculi are never found of any one of these principles solely, but some one or other predominates, giving the character. They may, by obstructing the regular course of the bile, cause its absorption, and thus give rise to jaundice.

Such are the anatomical characters and general nature of the principal organic diseases of the liver. We shall now proceed to their symptomatology.

Symptoms.—Perhaps there is no order of organic diseases in the whole human frame in which symptoms assist less than in that under consideration. In some of the more acute forms of disease the symptoms are urgent; but, except in a few instances, they convey little or no information with respect to the nature or progress of the disease; and in the more chronic and obscure forms, irreparable mischief is often established before the patient even suspects that there is anything wrong.

Many of these diseases, and indeed all of them in particular cases, produce certain constitutional symptoms, which, taken into account with the local ones, should any be present, will enable us to suspect, indeed confirm us in the belief of the existence of some sort of hepatic disease. But most commonly we obtain no farther instruction, and the real or precise nature of the disease remains in obscurity. We have nothing to do with inflammatory affections here: they have been already considered. But as hyperæmia may be accompanied with considerable enlargement of the organ, it will always be right in all suspected cases to examine the region of the liver, and ascertain whether any indication can be drawn from it.

When it extends or projects considerably below the ribs, it can, unless some obstacle exist, be felt, and its size pretty accurately determined; but in cases of ascites there may be considerable difficulty. The writer has often found the following plan succeed:—Place the hand upon the right side of the abdomen, and make the patient suddenly turn upon his belly inclining upon the right side; the enlarged liver will gradually sink through the fluid, and striking the parietes, will communicate a distinct impulse to the hand. Although this, should it occur, at once indicates the projection of the liver and the probability of its enlargement, yet the absence of this sign does not infer the converse, nor preclude the possibility of enlargement. Adhesions, for instance, by tying down the liver, will prevent the floating motion essential to the development of this sign.

Percussion often enables us to determine the height, or rather the encroachments, made by the liver upon the capacity or boundaries of the thorax. By this means the margin of the liver may be completely and accurately defined, and a tolerably accurate idea formed of its volume and extent.

There are no peculiar symptoms which will enable us to determine the presence of *anæmia* of the liver. *Induration and softening* may in particular cases be determined by the touch. *Hypertrophy and atrophy* may be discovered,—the former by the great increase of volume evident to the touch; the latter by the diminution ascertained by percussion. With respect to hypertrophy, it may be observed that there is no accurate means of diagnosis between it and hyperæmia. *Tubercles* may be felt in very thin persons, and if situated anteriorly; but there is no symptom peculiarly characteristic of them. The other diseases afford no symptoms by which they may be distinguished. Even gall-stones, unless passed by stool, afford no symptom by which their existence can be positively determined. Gall-stones passing through the ducts very often excite excruciating pain, cramps, sickness, vomiting, hiccup, &c.; but these symptoms indicate but little while they last; and more frequently it is after the passage of the stone, and after the subsidence of the symptoms, that we are able to form some opinion as to their nature and cause.

There are, however, certain general symptoms, which, when present, enable us to pronounce pretty positively as to the existence of hepatic disease, though they will not assist in determining its nature. These are dropsy, certain forms of indigestion, and jaundice; subjects already fully treated of in different parts of this work.

Other functions, as the respiration, circulation, those of the tongue, skin, and urinary apparatus, —the last especially, become deranged. The respiration and circulation merely present the common indications of irritation—a hurried or accelerated action. The tongue is generally coated, and commonly furred. A disagreeable taste is felt in the mouth, and eructations take place. What is brought up by eructation exerts various effects. Sometimes it is bitter, cutting, acrid, even excoriating the lining of the pharynx. This in general depends upon over-acidity, or upon chlorine. The fur on the tongue is yellow; sometimes moist, sometimes dry; sometimes permanent, and in some cases it appears only in the morning, disappearing in the course of the day. The skin may be hot and dry, parched and rough; or it may be too relaxed, giving rise to cold clammy sweats.

There is no excretion, not even excepting the alvine evacuations, which is more frequently deranged in the diseases of the liver than the urine. Thus, bile may be detected in the urine when no other irregularity is present, by the application of muriatic acid; it is sometimes necessary to concentrate it by slow evaporation, when the addition of muriatic acid strikes a green colour.

But organic disease of the liver is almost always attended with a deposition of the lithate of ammonia from the urine on cooling, of a bright pink colour. It receives this colour from the generation and intermixture of purpurate of ammonia. The urine when passed, though of a deep pinkish colour, is generally clear and transparent; but on cooling, the pink sediment separates; and if collected upon the filter and examined while moist, exhibits a remarkably deep pink colour. This sediment is re-dissolved by heating the urine.

The urine, after filtration so as to separate the sediment, likewise presents a deep colour, owing to retaining a portion of the purpurate of ammonia in solution. In some cases the urine will remain of a deep pink colour, nor will any sediment separate. This arises from a deficiency of lithic acid. The purpurate of ammonia has a strong tendency to combine with lithate of ammonia, which latter, being rather insoluble at the ordinary temperature, precipitates on the cooling of the urine, carrying down the purpurate along with it. But if there be a deficiency of lithic acid, no lithate of ammonia can be formed, and consequently no precipitate will take place. Hence the purpurate remains in solution, and gives this very deep pink colour to the urine, and which remains on the cooling of the urine without the formation of any precipitate. (Vide Prout, p. 125.) "The most perfect specimens of this kind of sediment which I have ever seen," says Prout, "were obtained from the urine of dropsical individuals; they occur also, occasionally, in the urine of the hectic, and of those obviously labouring under certain chronic visceral affections, *especially of the liver.*" (Prout, loc. cit.)

Such are the circumstances which individually and conjointly may be considered as furnishing tolerably certain indications of an hepatic affection; but it is only from the combination of several of these together that we can form any estimate of the degree or extent of hepatic disease. It must be evident, however, that we possess no certain or unequivocal means of determining the nature of the morbid condition with which we have to contend. And, indeed, even if we could, in the present state of our therapeutical knowledge, it would afford no guide to the adoption of any special mode of treatment.

Treatment. — In considering the treatment applicable to the organic affections of the liver, it will be useful to arrange it under two heads—general and local; understanding by the first, those means which act on the system generally; and by the second, those which are supposed to act by some particular local derivation.

General Treatment. — The first of this order which naturally comes under consideration is bloodletting. As the general circulation not only frequently produces, but afterwards tends to keep up the state of hyperæmia, or one of irregular vascularity in the liver, the means of controlling this function naturally presents itself as the most effectual as well as the most powerful of affecting a condition depending upon it. There are several points of view, however, in relation to different objects, in which bleeding may be considered. If the substance, or rather the vessels of the liver be gorged, bleeding generally, according to the circumstances, will be advisable. This means, also, will be applicable in what may be termed congestion, in which the capillary trunks are distended. Bleeding acts, not by abstracting blood from the distended organ, but by reducing the force of the circulation—the vis à tergo, as it is called—and, consequently, lessening the quantity of blood directed to the part, as well as the impetus with which it is driven.

An active state of the bowels will also prove beneficial; and the choice of the purgative will often be a consideration of some moment. When the object is to prevent the irritation arising from fæcal accumulations, those purgatives should be selected which merely excite the bowels to propel their contents; these are rhubarb, aloes, colocynth, &c. But when there is an active state of circulation, with symptoms denoting any thing approaching to an inflammatory condition, the purgatives which produce watery discharges are found the most serviceable. In such cases the neutral salts, largely diluted and combined with a small quantity of tartar-emetic, are the most powerful remedies.

When the disease is a simple hyperæmia, and has not produced any considerable tumefaction, a short perseverance in the above means will often be found adequate to all the urgencies of the case.

Emetics are not indicated in organic diseases of the liver, although nauseating remedies, by the power which they exert upon the circulation, are well adapted to reduce its force in the phlogistic diathesis. But emetics are occasionally useful when the functions of the stomach have been involved. In cases of this description, the stomach becomes overloaded with a collection of foul, crude, acrimonious matter, which proves highly irritating to that viscus, and by its reaction disturbs the system at large, and often aggravates the disease of the liver. When indicated, the mildest in operation of this class are to be preferred, and the

practitioner will find ipecacuanha most suited to his purpose.

It should never be lost sight of that lingering diseases are highly debilitating, and that emetics also exert a debilitating agency; and, therefore, caution is necessary in their use, and more especially in their repetition. The more mildly and the more speedily an emetic operation is effected and terminated, the less its debilitating effects; consequently, means calculated to effect such an object will be beneficial. The most effectual method of ensuring this, according to the writer's experience, consists in the previous ingestion of a considerable quantity of warm water; the advantages of which are, that a much less dose operates; there is no retching, nor are there any of those abortive efforts to evacuate the stomach which prove so distressing and so debilitating to weakly patients; and the stomach being emptied of its contents, there is an end to all the involuntary exertions of the patient.

Sudorifics are only admissible where there is considerable inflammatory excitement, with a harsh dry state of skin. In such cases those medicines which determine to the surface and induce a relaxation of the skin will prove highly beneficial. The most efficacious of this class is antimony; and the preparation must be selected according to the circumstances of the case. Tartar-emetic, in small and nauseating doses, not only relaxes the skin, but at the same time reduces the vital powers and prostrates the strength; while James's or antimonial powder effects the first object without influencing to so great an extent the strength of the patient.

Under the head of corroborants or tonics may be included two orders of remedies—stimulants and restoratives. The first are inadmissible in almost any description of organic disease; and, indeed, those of the viscus under consideration are often attributable solely to a too free indulgence in the use of stimulants. Restoratives, however, are of a different nature, and they are such as are calculated to improve the health and to give to the organs their due activity. The two most important of this description are sarsaparilla and taraxacum.

Sarsaparilla certainly at one time attained a high reputation as a restorative, owing, probably, to its being resorted to immediately upon the breaking up of the health by a too free use of mercury. Much of the good under such circumstances having arisen from laying aside the mineral, practitioners were disappointed in its powers, having anticipated too much from it in cases of a different nature, and, as mostly happens, not only refused to allow the virtues thus inconsiderately assigned to it, but denied even those to which it has unquestionably a claim. Hence it was nearly proscribed, and its use, in fact, almost laid aside. However, sarsaparilla certainly has considerable powers as a restorative, and will be found eminently useful in fortifying the system, and in preparing it for more active remedies. Dr. Philip observes that sarsaparilla is highly useful in protracted cases of indigestion, and especially "where the languor of the secreting surfaces has become permanent." (On Indigestion, p. 203. See, also, p. 258.) It may be administered in the form of decoction or of extract, or, what is still preferable, the extract rubbed down in the compound decoction.

Taraxacum is also a remedy which has been extolled, and it certainly seems in many instances to exert a very beneficial influence. According to Dr. Philip, it not only assists the use of mercury, but may, under certain circumstances, be substituted for it. (Ibid. p. 221.) But he asserts, that to be beneficial it must be given in large quantity, which often oppresses. The writer of this article has often found it a very useful plan to combine the extract of dandelion with the decoction of sarsaparilla, in which way—that is, rubbed down with the decoction—it can be given in much larger doses, and to a much greater extent, with much less inconvenience than simply in the form of extract.

The mineral acids are tonic and restorative; the principal of these are the sulphuric and the muriatic. They will be found highly useful in those passive relaxations of the skin attended by profuse night-sweats. The sulphuric acid is the most powerful in these cases.

It often occurs, however, that in these cases the bowels are constipated; and the profuse discharge by the skin may be considered as a vicarious, though morbid, substitute for that of the bowels. If the sulphuric acid should check the discharge by the skin without exciting the bowels, it will aggravate the symptoms. The plan most effectual in such cases is the exhibition of the bisulphate of potass or of soda, according to either of the following formulæ;—R. Infus. ros. ʒx; bisulph. pot. ʒii; syrup. caryoph. ʒi; *m.* fiat haustus ter quaterve in die sumendus.—R. Infus, caryoph. ʒx; sodæ bisulph, ʒiss; syrup. zingib. ʒi; *m.* fiat haustus ter quaterve in die sumendus.

The nitric, and a combination of the nitric with the muriatic acid—nitro-muriatic acid—have been supposed to exert a special influence upon the liver. The nitro-muriatic acid has been supposed to act through the chlorine disengaged by the reaction of some of the constituents. Special virtues, however, have been denied, and the flow of bile attendant upon their application as a bath, ascribed to the action of a weak or diluted acid upon the skin. (*Paris*, Pharmacologia et aliis locis.) A solution of chlorine, however, in water, according to the experience of the writer, has some claim to specific agency, and will be well suited to the class of diseases under consideration. It may be prepared readily by passing a current of chlorine gas into distilled water, kept cold by being surrounded with ice, and in a dark place, as chlorine under exposure to light decomposes a portion of the water, and muriatic acid is formed. The chlorine may be readily degenerated by exposing either a mixture of muriatic acid and peroxide of manganese, or of common salt, peroxide of manganese, and sulphuric acid, to a gentle heat in a proper gas bottle fitted with a tube for conducting the evolved chlorine into the distilled water.* The solution thus prepared may be given in small doses, at intervals during the day; and we have in many very severe cases seen the best effects result from this plan. The effects are

* It should be conducted into the water, and retained in it by a due degree of pressure.

healthy discharges from the bowels, bracing the skin, improving digestion, and correcting the secretions, and not unfrequently a considerable reduction of the pain and swelling of the epigastrium and right hypochondrium.

The powers of chlorine are frequently enhanced by colchicum, and it will often happen that a combination of these two remedies produces beneficial results which cannot be obtained by either separately. The preparation best adapted to the present object, is either the vinegar or tincture. In habits which show a tendency to gout or rheumatism, and in which temperaments, in the advanced stages of organic diseases of the liver, hemorrhages of various descriptions are apt to occur, colchicum proves a valuable auxiliary, and therefore should be administered.

It may happen, from some peculiar nervous idiosyncrasy, or from extreme susceptibility of the alimentary tube, that any of these means will produce severe effects, purging for example, followed by extreme prostration. Such must be corrected by the exhibition of appropriate remedies. Opium naturally presents itself; but in many cases there will be found strong objection to the use of opium. The salts of morphia are in many cases less objectionable, and as they do not produce the disturbance so frequently caused by opium, they ought perhaps, as a general rule, to be preferred. The most suitable of the above salts are the sulphate and the muriate, and the writer has been in the habit of using a formula analogous to that of Dover's powder. It consists of one part of the muriate or sulphate of morphia, two of ipecacuanha, and eight of neutral alkaline salt—sulphate of potass or muriate of soda. This powder may be given in small doses, or it may be formed into pills with extract of hyoscyamus or conium. The advantages, according to the writer's experience, are, that it does not affect or suppress the natural secretions so much or so certainly as opium, and consequently is not so likely to give rise to fever, with thirst, dry tongue, and hard pulse, which should always be most carefully avoided.

The means just detailed, are calculated to make but a slight impression upon an organically diseased liver. Tumefaction, hypertrophy, &c. may in slight cases be removed; but more commonly, very little impression can be made upon the seat of the disorder. The object, therefore, is rather to improve the health, and to fortify the system so as to enable it to endure the debilitating effects of more active and more powerful remedies, which may now be considered.

The efficacy of mercury in the treatment of the disorders of the liver is well known. It is the remedy to which all resort; and, as it frequently occurs in the exhibitions of medicines without principle, the prescriber is often doomed to experience disappointment. The first thing to be considered is, what is the action of mercury upon which we depend, and what the system to which we ought to direct its action for the relief of organic disease.

One of the principal effects of mercury is to excite the absorbent system; and it is upon this action that the practitioner must rely for its efficacy in diseases of the liver. The diseases of this organ, too, partake mostly of the congestive character, in which the vessels become distended with their natural contents, and consolidate from a degree of stagnation. This effect of defective or suppressed circulation is very perfectly shown in the consequences of peripneumony, in which we first perceive engouement—a gorged condition of the vessels, with impeded circulation terminating in consolidation—hepatization, as it is termed, of the lung. Mercury, by acting on the absorbent system, causes or rather promotes the removal of the solidified mass. But mercury likewise promotes or excites the activity of the circulating vessels. This is indicated by various phenomena —the fever induced by the mercurial action, the hardening, quickening, with frequency of the pulse. Therefore mercury appears to give an impulse to the circulation, and in all probability promotes the action and functions of the extreme vessels; consequently it excites their contractile powers, and thus enables them to force forward their contents. This appears to be the principle upon which mercury acts in removing such morbid conditions.

To ensure such results, we next inquire in what way the remedy should be given, or under what circumstances will such an effect be produced. The mercury must accumulate and produce its specific effects in the system. Hence it must not be suffered to pass off by the bowels; but it must be exhibited in such a manner as will ensure its accumulation without either purging or great irritation, which latter, by its reaction on the circulation, will tend greatly to increase the mischief and aggravate all the symptoms.

There are several modes of introducing mercury into the system; the principal are inunction, fumigation, and its internal exhibition. Inunction is frequently practised in liver affections, and was often considered the preferable mode; the remedy being applied in the neighbourhood, was supposed to pass into the organ; a principle which, even if well founded, would confer no particular benefit. The advantages occasionally derived from inunction, are referable rather to the friction than to the medication, the ointment merely serving to diminish the irritation from friction. Therefore, the circumstances which would lead the practitioner to prefer inunction or friction, are a peculiar irritability of the stomach and digestive tube, and a morbid sensibility to the local influence of the remedy. This is sometimes considerable, and frequently a source of great embarrassment to the practitioner.

Fumigation is applicable when the object is to bring the system under the influence of mercury in the least possible space of time.

The internal exhibition of mercury, however, is that upon which practitioners mostly depend; and it should be continued till its specific effects appear in a slight tenderness and tumefaction of the gums. Various preparations of mercury are resorted to for this purpose, and it may perhaps be useful to consider concisely the pretensions of the most active.

The preparations of mercury in most repute, are calomel and blue pill; the former is the more active but irritating, the latter the milder but more oppressive to the stomach. In some constitutions at all times, and in some only under particular

circumstances, calomel so irritates the stomach and bowels as to do much more harm than good. It is possible occasionally to correct this tendency by combination with a narcotic, as extract of henbane, hemlock, or Dover's powder, which last not only corrects the irritability of the bowels, but also favours the entrance of the mineral into the system. If, notwithstanding all these precautions, this preparation should irritate, some other formula must be substituted. The oppressive action of blue pill arises from the sugar and the vegetable matter of the confection of roses, and the fibrous matter of the liquorice-root used in its preparation; its comparative inertness, upon the large proportion of the metal which escapes oxidation. Blue pill, however, will often answer the purpose, and prove even sufficiently active when calomel could not be administered.

The stomach may be strengthened so as to resist the irritating action of calomel, or the oppressive influence of blue pill, by exhibiting a mild tonic or aromatic draught about an hour before giving the mercury. The writer has found the infusion of cloves with the aromatic spirit of ammonia the most effectual for this purpose.

We have frequently found it an efficient practice to resort to the grey or protoxide of mercury. This is uniform in strength, and is not necessarily, as in the preparation of the blue pill, combined with agents which exert an oppressive action upon the stomach. The requisite dose may be combined with extract of hyoscyamus, or any other similar extract, or it may be given in powder. It is asserted by Dr. Barker, that a portion of the protoxide is apt to pass to the state of peroxide. The contamination, however, probably results from original impurity. The London College direct it to be prepared by the action of lime-water upon calomel; and as calomel is occasionally contaminated with oxymuriate, of course in such cases there will be an intermixture of peroxide. The best way of preparing protoxide of mercury is to form a proto-nitrate by the action of diluted nitric acid unaided by heat, and then precipitating by means of potass, and washing the precipitate. The protoxide thus prepared gives no indication of peroxide, even when kept for a considerable time.

Other preparations of mercury have been used, as the oxymuriate, but this is not generally the best for employment, although the writer has met with many instances in which it superseded all the other preparations. In general, the best way of giving it is with the decoction of sarsaparilla.

The acetate and the phosphates of mercury are very active preparations, and agree very well with the stomach. The advantages of the latter preparations are that much smaller doses answer, an object of moment when the stomach is apt to be oppressed; and in the case of the acetate, the readiness with which its acid is decomposed in the stomach or in the system, and the mineral introduced.

Sometimes the irritation arising from mercury, depends upon the existence of a free acid, or perhaps free chlorine in the stomach. In such cases not only is the sensibility of the mucous lining morbidly acute, but a more irritating preparation is formed. This may be corrected by some absorbent earth, as chalk, lime, magnesia, or an alkali; and this probably will explain the advantages experienced by the writer, and mentioned in a preceding column, from exhibiting spirit of ammonia in infusion of cloves, before taking the mercurial. In similar cases, the hydrargyrum cum cretâ, or with magnesia,* will frequently answer the purpose: but the most certain plan consists in giving the absorbent an hour or so before the mercurial.

Many years since it occurred to the writer that the powers of mercury might be greatly enhanced by combination with iodine, in accordance with an acknowledged rule or principle in pharmacology, that the virtues of remedies exerting singly a similar specific agency, would be greatly increased by combination; and the preparation of the proto- and deuto-iodurets of mercury† were consequently administered in various tumours and enlargements; such as bronchocele, hepatic and other visceral enlargements, and indeed all descriptions of abdominal swellings. The results were highly satisfactory. One or two cases even of white swelling and hip-joint disease perfectly recovered by the use of the iodurets of mercury with the means to be presently detailed. It is, however, in glandular swellings and in the vascular congestions of parenchymatous structures, and the consecutive organic changes which these structures undergo, that this combination is most effectual. In a treatise on organic disease, printed in 1824, we have entered fully upon this subject and the different objects to be kept in view.

More recently we have had some opportunities of again proving the efficacy of this preparation. A young woman in the country began to swell about the abdomen, and was considered pregnant by her medical attendant. She came to town, and a medical friend was requested to attend her in her accouchement. He, however, doubted the pregnancy, and her time having elapsed without any diminution of size, calomel and hydriodate of potass were given, and an abdominal swelling of nearly eleven months' duration, and which confined the patient to bed for more than two months, was reduced in about three weeks, and the patient restored to perfect health. A second instance occurred in the practice of another medical friend. It was an abdominal swelling, probably of an ovarian description. We recommended the plan pursued in the last case. It was, however, some time before it could be put into execution, and the swelling remained unabated. At last, however, it was adopted, and in about three or four weeks the abdomen was reduced to its natural size. This patient, however, died, (the constitution having been completely broken up by previous dissipation,) but on examination no indication whatever could

* To these preparations the same objections apply as to blue pill — namely, the partial or imperfect oxidation of the metal. The grey or protoxide prepared as above, and mixed with the chalk or magnesia, (the latter preferable,) will be found the preferable formulæ for exhibition.

† The proto- and deuto-iodurets of mercury may be prepared extemporaneously, by mixing calomel or oxymuriate of mercury with the equivalent of hydriodate of potass; an interchange of principles takes place even in the dry way. It is, of course, intermixed with muriate of potass, which might be washed out if it were of importance to free the preparation from such an impurity.

be traced of the part which had been enlarged. One ovary, probably the diseased one, had entirely disappeared.

The iodurets affect the mouth in the same way as the more ordinary preparations of this mineral. They may be given in similar doses, and the deutoioduret in larger doses than the oxymuriate. They may also be introduced by friction; but the deutoioduret almost always produces a bright scarlet efflorescence of the skin, which mostly terminates in desquamation. The precautions as to correctives, when considering mercury generally, are equally applicable to the iodurets.

Some constitutions powerfully resist the mercurial action; such stubborn resistance is to be overcome, in plethoric habits, by bleeding, by nauseating doses of emetics, by opiates, and other well-known means. The introduction of mercury also is often attended with a febrile irritation or excitement, which, reacting on the diseased viscus, counteracts whatever benefit might otherwise be obtained. This must be kept in subjection by bleeding and other antiphlogistic measures, and by local measures which will also prove auxiliary upon other principles.

The affections which will be benefited by this plan are hyperæmia of every description, hypertrophy and all sorts of enlargement, induration, scirrhus, tubercular conditions, even the scrofulous, and most adventitious deposits, excepting the osseous, and even this perhaps if incipient. Its efficacy is questionable in abscess, ulceration, and cancer; but still it may be likewise questioned whether the iodurets should be wholly proscribed in such affections were we satisfied of their existence. It is not improbable that if the absorption of the diseased structure were effected, healthy deposition might be substituted in its stead.

It may be inquired for what length of time the mercurial preparations should be continued. Mercury, it has been already observed, not only excites a febrile irritation, but also exerts a noxious influence upon the economy at large, and this influence is directly as the quantity and its effects. Therefore, the object is to induce the specific effects with as little irritation as possible, and with the least possible quantum of the mineral. But in many instances the effects having been induced, the mercury must be laid aside, and the disease will remain stationary; and the practitioner must again and again have recourse to the remedy. Each succeeding application to mercury is attended with severer consequences, and it often happens that on the subsidence of the organic affection the patient finds it effected only by a total breaking up of the constitution, and a fatal sacrifice of health. The debilitating or rather exhausting effects of mercurial courses are too generally understood to need any comments in this place. Upon reviewing these facts it occurred to the writer that the good effects resulting from the iodurets of mercury might be kept up and a beneficial influence exerted on the disease by some other of the metallic iodurets. With this view, upon the first indication of the mercurial influence, whether the development of the specific influence upon the gums, or a reduction of the disease, the ioduret of iron or of zinc was given, or the hydriodates of these metals in solution. The result was extremely satisfactory; and morbid conditions which had been but slightly affected by the mercurial iodurets were completely dispersed under the ioduret of iron or of zinc. These preparations will be found much better adapted to weakly, irritable, and leuco-phlegmatic habits. Of these two the ioduret of iron is perhaps the most irritating and inflammatory, that of zinc the least so. They may be given either in pills, or in solution, as hydriodates, readily by mixing a solution of the equivalent of sulphate of iron or of zinc with one of hydriodate of potass; an interchange of principles and the formation of the new salts, hydriodate of iron or zinc, is the result.* Whatever objections may offer to the employment of the mercurial iodurets in cancerous, scrofulous, and other cachectic diseases of the liver, none such can be urged against those of iron and zinc, and therefore, the practitioner may safely appeal to them under the assurance that he is not employing a destructive or injurious remedy. The doses of these salts must be regulated in a great measure by their effects. From one grain to ten, according to circumstances, may be given three or four times a day; the practitioner recollecting that the smallest doses should be tried at first. Another circumstance to be attended to is that the system becomes blunted by habituation to a remedy. Increasing the dose is often carried to an extreme without benefit, and frequently not without injury. The susceptibility cannot be kept up by over-doses, but when dormant it may be awakened by a temporary suspension of the medicine. Thus, when the average extent of dose fails to produce its accustomed effects, the medicine should be laid aside for a time; and when a respite has been thus granted to the system, we shall find all its sensibility restored, and we may again resort to our means, confident of finding the usual susceptibility to impression.

The state of the urine has been noticed in a previous part of this article, and an examination of it will often afford useful information. There are two conditions of it, however, which deserve attention in hepatic diseases, namely, an excess of urea, and its ready coagulation by heat. This latter property arises from albumen or chyle, and is often present in the dropsies consequent upon hepatic disorder. It may be laid down generally that such conditions forbid any active use of mercury. It betokens a state of system altogether hostile to the use of this mineral. But the metallic iodurets just considered, according to the writer's experience, are not liable to the same inconveniences.

During the pursuance of all the above means, it will be necessary to attend not only to all the functions, but to the conditions of the organs which perform them. When we find urea in excess, or the curdy coagulation depending on the presence of chyle, there exists an irritability of system which must be soothed by morphia, hyoscyamus, and the acetic extract of colchicum, which will be found a most valuable auxiliary under such circumstances. The denser coagulation arising from albumen indicates not only irritability, but an excitability of the phlogistic character, which must be subdued by venesection (especially if

* In this case sulphate of potass remains in the mixture, but the impurity is of no moment.

attended with local pain) and other suitable modes of evacuation. It is almost unnecessary to observe that the digestive functions should be closely watched, and the condition of the organs attended to, and any degree of aberration immediately corrected. Hence the advantage of occasional stomachics, &c. Should the disorders of organs secondarily affected remain unheeded, they will soon, by their reaction, aggravate all the symptoms of the primary disease.

Local Means.—While the practitioner is endeavouring to subdue disease by what are termed general means, he should frequently examine the region or seat of the diseases. This will in many cases be found swelled, painfully sore or tender. These states are to be relieved by those means which directly deplete the part itself. Leeches therefore should be applied: and it is often useful to repeat the leeches at regular intervals, that is, every three days, every week, every fortnight, &c., according to the extent or severity of the pain or tenderness.

It is often useful to alternate leeches and blisters, and the most surprising improvement frequently results from this practice. In some cases, however, blisters alone prove most serviceable, leeches only debilitating and distressing the patient, and in others the converse of this will prove the case. It is almost impossible to determine, *à priori*, which of the two plans or whether a union of both will be found the most effectual.

Various plasters which excite or irritate the skin sometimes do good, when neither leeches nor blisters can be endured. Burgundy pitch is of this description; but the most effectual is the "emplastrum ammoniæ,"—a combination of muriate of ammonia and soap, in which the alkali gradually abstracting the acid, the ammonia is disengaged, and applied in its escape to the skin, which produces a beneficial irritation. It should, however, be applied immediately on its preparation, and to insure fully its beneficial effects it should be frequently renewed.

Of all the local means, however, there is nothing equal to a perpetual drain in those chronic conditions termed organic disease. Setons and issues are not so often resorted to as their remedial efficacy would lead us to expect. Organic disease is a result accomplished by a very slow and gradual process, and is not, like acute disease, to be immediately suppressed or removed. The constant drain effected by an issue from the general system will also greatly tend to keep down febrile excitement, which it is well known greatly aggravates local disease of every description. A caustic issue, therefore, which is perhaps the most convenient and the most manageable, should be inserted in the region of the diseased viscus; and its exact position and extent should be regulated by the nature, extent, and severity of the tenderness.

The effects of setons, issues, &c., are slow, though progressive, and sometimes a depression of strength supervenes during the continued action of the permanent drain. This proves as embarrassing to the physician as distressing to the patient. In such cases a little more generous diet must be allowed, and mild, unirritating tonics administered; and if the loss of strength prove extreme, the issue must be dried up for a time, or the discharge reduced by the removal of an adequate proportion of the peas.

When we find it necessary to heal the issue, and at the same time to support the strength by tonics, in certain temperaments of the nervo-sanguineous character, languid inflammatory action is apt to be excited. This is best kept down by occasional cupping, leeches, &c. Where even so small a loss of blood seems prejudicial, the best effects result from dry cupping, repeated at short intervals. Dry cupping often proves the most effectual remedy in some forms of hyperæmia and engouement, and its effects upon the accompanying tumefaction are as surprising as they are inexplicable.

Organic diseases of the liver induce a train of consequences both severe and troublesome. The functions and structure of other parts become deeply engaged; and hence dyspepsia, dropsies, apoplexies, and inflammatory affections. In all cases, the complication must be attended to, and, as far as possible, its reaction on the system at large, and on the primary affection counteracted. The means of accomplishing this consist in those peculiarly adapted to the removal of the secondary disease itself, modified, however, by the existing circumstances. The practitioner, however, must be prepared for a tedious disease, and he must not relax in his endeavours, nor give up in despair, if the amendment should not keep pace with his wishes.

R. Venables.

Liver, Inflammation of the. Hepatitis, from Lat. *hepar*, Gr. ἧπαρ, *the liver*.

The history and symptoms of inflammations of the liver have been peculiarly dwelt on in all works on medicine, from the earliest periods. In fact, until very recent times, when the attention of physicians was more especially called to the diseases of the gastro-intestinal mucous membrane,—heretofore a comparatively unexplored field,—this affection and its subsidiary diseases were more studied than any other lesion of the digestive apparatus. (See Gastro-Enteritis.)

Pathology.—The liver may labour under the effects of increased quantity of blood in its parenchyma, from several causes. Of these, the two most important are—1. *active congestion*, the result of irritation in its tissue, either primary, or the consequence of some other lesion originating in its own substance, or some other organ with which it sympathizes; and 2. *passive congestion*, induced by mechanical obstruction to the exit of its venous blood. This obstruction may be seated in the hepatic veins, the heart, lungs, or even in the aorta, (*mechanical hyperæmia of Andral.*) In addition to these, two other sources of congestion are mentioned; one a stasis of blood, similar to that which occurs in organs attacked with scorbutic disease, and the other the congestion which occurs so remarkably in intermittent fever; a congestion sometimes so intense as to induce hepatic apoplexy.*

The results of inflammatory action on the liver vary according to the intensity, length of duration, and situation of the disease. In general, the first

* *Bailly*, Traité anatomico-pathologique des fièvres intermittentes, simples, et pernicieuses, 1825. See, also Mackintosh, Cleghorn, &c.

visible effect is the production of increased vascularity of the parenchyma, which may be either general or partial; but we believe that in the majority of cases the latter is most frequent. This is accompanied with tumefaction of the part, and is the first stage of acute inflammation, as far as this can be demonstrated by the knife: under these circumstances the hepatic tissue is extremely red, and blood flows copiously when it is divided by the scalpel.

In a still more advanced stage, in addition to the vascularity, we observe a remarkable softening of the part, sometimes so great that a slight pressure will reduce it to a mere pulp. This stage is analogous to the second stage of acute pneumonia, and, like it, may be accompanied by the formation of pus or lymph on the serous surface. In this respect, however, there is a great difference between the liver and lung, as we seldom meet with pneumonia without serous inflammation, while the reverse often obtains in hepatitis. This is a point of great importance in the surgical treatment of the disease, and one to which we shall recur.

On this subject Mr. Annesley makes the following remarks:—"When the surfaces are the seat of inflammatory action, the internal structure of the organ generally participates in it to a greater or less extent, and likewise, when morbid vascular action commences in the parenchymatous structure, it sometimes extends to the external surface; but this more rarely occurs in India than the former mode of extension, the internal structure appearing to us to be more frequently the seat of the inflammatory state than the surfaces, which seldom participate in it till the more advanced stages of the disease. We frequently observe in India the internal structure of the liver inflamed to the greatest possible extent, without any effusion of lymph from its surfaces, and the inflammation of structure may go on to the production of several abscesses in both its lobes, or of one very large abscess in the eighth lobe only, without any decided marks of inflammation of the envelop of the organ, except some alterations of colour merely, which are usually occasioned by the states of the parts immediately underneath; nay, even abscesses of the liver may proceed to the utmost extent, and ultimately break into the abdominal cavity, without having induced inflammation of the serous surface where they point, and consequently without forming adhesions to the parts with which they are in immediate and close contact. (Annesley's Diseases of India, vol. i. p. 406.)

In the report of the Meath Hospital, by Dr. Graves and the writer of this article, (Dublin Hospital Reports, vol. v.) the important fact of the rarity of adhesions in cases of hepatitis, even after the formation of abscess, is noticed. This is a fact which we had observed long before the appearance of Mr. Annesley's work, and one from which it would appear that both in the warm and temperate climates acute inflammation of the liver is much more seldom complicated with serous inflammation than a similar state of the pulmonary parenchyma. It is not easy to explain this singular but most important difference; but it is obvious that the only mode of arriving at a solution of the difficulty is to compare the physiological relations of the two membranes.

It has been long admitted that the peritoneum is less liable to the adhesive inflammation than the pleura, as, in our examinations after death, we commonly meet with adhesions of the pleura, while those of the peritoneum are comparatively rare. This fact, however, may, to a certain degree, be explained by the greater fatality of abdominal inflammations, a greater portion recovering from pleuritis than from peritonitis. The more frequent affection of the pulmonary serous membrane in cases where the subjacent parenchyma is engaged, may be explained partly by the greater degree of motion which, in consequence of the function of respiration, the two pleural surfaces are exposed to; as in this way the parts are not only predisposed to inflammation, but a slight effusion of lymph may become an exciting cause of disease by its mechanical action over an extensive surface. Again,—if, as there is great reason to believe, the air-cells are in reality white tissues, the propagation of inflammation from them to a similar structure ought more readily to take place than from the glandular acini of the liver to an essentially different tissue.

The next stage of hepatic inflammation which has been described is that of purulent formation or abscess; but we believe that between this condition and the red softening of the liver there is an intermediate stage, in which the hepatic tissue is found of a yellow colour, exceedingly soft, and leaving a puriform exudation on the scalpel. Between this state and the third stage of pneumonia there appears to be a great analogy, as it is an interstitial suppuration immediately preceding the formation of abscess. In several instances we have observed this alteration to extend to some distance around an hepatic abscess, and in cases where numerous small purulent collections existed, the hepatic tissue which separated them had undergone this change. The tissue thus altered varies considerably in consistence, in some instances being almost semifluid, in others possessing a certain degree of firmness. As yet this condition does not appear to have been recognised in the systematic works on pathology.

Lallemand, in his "Lettres sur L'Encéphale," speaks of a softening of the liver, in which, in consequence of severe inflammation, its tissue is reduced into a diffluent sanies of the colour of wine-lees; but this condition is obviously different from that we have just described.

Abscess of the liver, so common in India, is of rare occurrence in these countries. A few isolated cases are to be met with in medical records, but no series of cases was published as occurring in Europe until the appearance of Louis's researches on this subject. (Recherches Anatomico-pathologiques. Paris, 1826.) Subsequently, the writer of this article, in conjunction with Dr. Graves, published several examples of this lesion. (Dublin Hospital Reports, vol. v.)

Puriform matter, as the result of inflammation, is met with in the liver under several forms. We may find it, as it were, infiltrated into the hepatic tissue, as described above,—a condition to which the name of yellow softening of the liver may be given; it may occur in numerous minute ab-

scesses; or, lastly, it may form one or more large collections of matter, in some cases encysted, in others bounded only by softened and yellow hepatic substance. These collections of matter are generally isolated, though in a few cases they have been found to communicate by fistulous passages.

As yet we are not fully aware of the circumstances which dispose to the formation of a cyst around these puriform collections. The more chronic the abscess, the greater will be the likelihood of a cyst existing, but it will often be found even in recent cases. We have seen these cysts under very opposite circumstances. Thus, in a case which occurred in the Meath Hospital, where, after acute hepatitis, the patient sank with suppuration of the liver, we found numerous abscesses, some the size of an orange, others that of a hazelnut, the smaller being encysted, the larger not so. In another case, however, the reverse of this was observed. A patient had laboured under gastro-enteric fever for some time, when attention was directed to his liver, from his complaining of pain in that situation. The organ was then found enlarged, and it soon became evident that matter was forming. The patient died, and on dissection, a vast abscess in the right lobe, capable of containing several pints, was discovered: this was encysted, while in the remainder of the liver were numerous small abscesses, only separated by softened hepatic tissue. In another case, the particulars of which we shall detail hereafter, a very chronic abscess, communicating with the duodenum, existed in the right lobe, while a recent one, which had opened into the peritoneal cavity, was found in the left. In the first abscess, which had existed under our observation for two months, we found the cavity empty, and lined with a strong semi-cartilaginous membrane, of a dark greyish colour; while in the second there was no cyst whatever, its parietes being formed of yellow softened hepatic tissue. The last case which we shall notice on this subject is that of a woman who sank under a very chronic abscess of the liver. Here the cavity was of enormous dimensions, and presented an imperfectly formed cyst, most developed where the parietes of the abscess were thinnest—that is to say, immediately under the serous covering of the convex surface. In the more deep-seated parts it could hardly be detected.

The appearances of structure of these cysts are various. In some cases we only observe a pseudo-membranous layer, of a line or two in thickness, yellowish white, and resembling semi-concrete pus. In other cases the cyst appears organized, and may strongly resemble a mucous membrane; presenting villosities more or less completely developed, which we can easily demonstrate by immersing the part in water. A third variety presents the lining membrane of a reticulated structure, for which the name of fibro-mucus has been proposed; while in the last species the membrane is semi-cartilaginous, of an iron-grey colour, and very similar to the investment of chronic tuberculous cavities in the lung.

Nothing can be more various than the size of these abscesses. We have seen them so large as to be capable of containing four pints, and, on the other hand, they may be so minute as to represent suppurated tubercles, from which indeed it is sometimes difficult to distinguish them. The surrounding hepatic tissue is generally in a state of red or yellow softening, but cases are on record where it has been found perfectly unaltered; in these the disease was generally chronic. The same variety is observable in the nature of their contents. In all our cases, but with one exception, the matter was healthy, though sometimes mixed with portions of softened hepatic substance. In the case of exception, in which the operation of opening the abscess was performed successfully, the matter was of a dirty green colour, and mixed with sanious fluid. Andral states that in all the cases in which he found puriform matter in the liver, it was white and consistent, like the pus of a phlegmon, and that those who have described it as similar in colour to the lees of wine have confounded other diseases, particularly the occurrence of encephaloid matter, with the inflammatory suppuration. In warm climates, however, great variety is observed in this respect. "The matter," says Mr. Annesley, "contained in an abscess presents various appearances. In some it is a thin, watery pus; in others, it is thin, watery, and with thick curd-like clots floating in it; in many cases it is perfectly purulent, and of varying degrees of consistence. As respects colour, there is also considerable difference; most frequently the matter is of the usual yellow colour. Sometimes it presents a yellowish-brown or sanious tinge, and occasionally a greenish-brown or greenish-yellow hue; sometimes it is watery or reddish brown; at other times it is observed of a creamy consistence, and nearly white. (Op. cit. p. 533.)

It is to be regretted that the relations which exist between the vessels of the organ and these collections of matter have not as yet been made the subject of any accurate investigation. We cannot find any instance recorded, where, as in tuberculous and other cavities in the lung, vessels were found traversing the puriform collections. They have been observed, however, forming projections on the internal surface of the cysts; but when we consider the vast size to which hepatic abscesses may attain, the inquiry as to what has become of the vessels becomes a matter of extreme interest, and in the present state of pathological anatomy offers a new field for inquiry.

The abscess once formed may open in a great variety of situations both internally and externally. Of the internal openings we have witnessed the following examples:—1. perforation of the diaphragm and communication with the lung; 2. communication with the duodenum; 3. perforation of the peritoneum, and effusion into the abdominal cavity.

The first of these terminations appears to be a not unfrequent and perhaps the most favourable of the internal openings of the abscess. Many patients have recovered where this lesion undoubtedly occurred, as indicated by the fact of their presenting all the symptoms of hepatic abscess, both constitutional and local, which subsided upon the occurrence of a sudden and copious expectoration of purulent matter, which had not been preceded by any symptoms of pulmonary disease. We have known of cases where pressure exercised on the hepatic region was immediately followed by a free expectoration of pus. The easy exit of

the purulent matter, the result of its entrance into the bronchial tubes, is in all probability a principal reason why this termination of the disease should be so often favourable. The abscess may open either into the right or left lung; and though there are some cases where the pulmonary pleura was not perforated, yet the communication with the pulmonary parenchyma and bronchial tubes is much more frequent than the formation of an empyema, — a circumstance explicable by the great tendency to adhesion presented by the pleura.

Dr. Smith, an American writer, details a case where the hepatic abscess opened into the pericardium. The liver, which was almost entirely occupied by an enormous abscess, adhered closely to the upper portion of the diaphragm, through which the opening between the abscess and the pericardium existed; the pericardium was inflamed, and contained about two pints of a purulent liquid similar to that which existed in the liver.

It would appear, then, with respect to the thorax, that the abscess may open into the lung, pleura, or pericardium. Of these, the first is by far the most frequent. With respect to the abdomen, the abscess may communicate with some portion of the gastro-intestinal tube, the peritoneal cavity, the gall-bladder, the vena cava, or kidney. In the cases where the opening has taken place into some portion of the digestive tube, its seat has been in the stomach, duodenum, or colon.

Lastly, the abscess may open externally in a great variety of situations upon the abdomen, and also on various places on the side and in the axilla. When the opening takes place externally, it is seldom by a direct, but commonly by a sinuous and fistulous passage. Louis, in his *Recherches Anatomico-Pathologiques*, declares that he has never yet known of the occurrence of a cicatrix in the liver, the result of a cured hepatic abscess. We feel satisfied that this is a pathological appearance rarely observed in the dissecting-room, — a circumstance to be explained by the rarity of the disease in this country and its general fatality. In one case, however, we have witnessed this rare appearance. A patient who had been a soldier in the East-India Company's service, and who had, while in India, suffered from an attack of hepatitis, accompanied, as he described, by great tumefaction of the liver, died in the Meath Hospital of a chronic enteritis. On dissection the right lobe of the liver was found greatly diminished in volume; while in the centre of its convex surface existed a very deep stellated depression, around which the hepatic tissue was puckered, rising in the form of crests with intervening sulci of nearly an inch deep. From the centre, which was occupied by a mass of cartilage nearly the size of a walnut, emanated prolongations of thin plates of cartilage, answering in number to and forming the base of the sulci which appeared on the surface. In this case we are not able to determine by what aperture the contents of the abscess had been evacuated, but in all probability it was through the duodenum. The appearances on dissection in this case were almost identical with those in a case of cicatrices of the liver, of which Mr. Annesley gives a beautiful drawing, (see plate 15 of his book.) This gentleman states that he has met with several cases of these cicatrices in India. There is a form of disease which is very liable to be confounded with hepatic abscess, as it has many symptoms in common with this affection; we allude to a circumscribed inflammation and suppuration in the parietes of the abdomen, immediately over the liver. The disease sets in with fever, pain, tumefaction, and tenderness in the affected part; and, in addition, we have many of the constitutional symptoms of hepatitis. In one case, which occurred in the Meath Hospital, a slight jaundice existed for several days, analogous, in all probability, to that arising from diaphragmatic pleurisy. These cases are generally of little severity as compared with true hepatitis. Matter forms speedily under the integuments, and, on this being evacuated, the patient rapidly recovers. In a case, however, which we have witnessed, the disease proved fatal under very remarkable circumstances; we shall therefore notice it at greater length. A woman aged twenty-three, who had laboured under amenorrhœa for twelve months previously, was attacked with cough and hemoptysis, followed, after some days, by fever, pains in the back and limbs, and prostration of strength. Soon after this she complained of pain in the right side of the chest and hypochondrium, increased by coughing, pressure, or motion. She had a distressing short cough, with yellow tenacious expectoration. The inferior portion of the right side of the chest sounded dull, and the respiration in this situation was almost inaudible except when she made a forced inspiration. The symptoms having continued for about a fortnight, an uncircumscribed puffy tumour made its appearance over the lateral portion of the liver; the hemoptysis returned, with a hard teasing cough, but the fever disappeared; poultices were diligently applied to the tumour, which rapidly enlarged and presented evidences of extensive suppuration. On the thirteenth day after its appearance it was opened by means of an abscess-lancet, when a great quantity of matter mixed with blood was discharged; at this time the spitting of blood ceased. In about three weeks, however, the abscess again appeared, and rapidly increased to a size much greater than its former dimensions; it was again opened, and a large quantity of purulent matter given exit to. On the next day the abscess presented the appearance of an enormous anthrax, with edges about two inches high, from which a quantity of whitish slough could be detached by pressure; the patient was now emaciated, had diarrhœa, with cough and sanguinolent and puriform expectoration. We endeavoured to trace the extent of the disease by introducing a probe; but although this was found to pass extensively under the muscles and cellular substance, yet it could not be introduced either into the thoracic or abdominal cavity. After some time it was found that when the patient coughed, or took a deep inspiration, air escaped with great violence from the base of the ulcer, towards the upper portion of which a circular fistula, through which a probe could be passed, was observed; through this the probe passed for about three inches, when it met with a solid resisting body. The inframammary region sounded clear on percussion. Examined by the stethoscope, the respiration was

cavernous, and accompanied during inspiration by a sound like the tick of a watch. When the patient coughed or made a forced inspiration, a loud guggling was audible. There was no metallic tinkling, *bourdonnement*, or pectoriloquism; but the voice resounded strongly from the sixth rib upwards, while anteriorly and posteriorly the respiratory murmur appeared natural. She died on the following day.

Dissection.—Great emaciation. The external sore extended from the sixth to the tenth rib: it was about four inches in breadth. Between the eighth and ninth ribs the fistula was plainly observable. On opening the abdomen, the serous membrane was found healthy, with the exception of that portion which covered the liver laterally and superiorly. Here the liver adhered to the diaphragm.

On the centre of the convex surface of the liver we found the base of the abscess formed by a circular portion of thick, false membrane, of about two inches in diameter, *external* to *the hepatic peritoneum*, but producing a depression on its surface. The costal portion of the diaphragm, for an extent corresponding to the base of the abscess, was destroyed, but adhered round its edges. This abscess communicated with the lung by a perforation through the diaphragm of about the same size as the external fistula, which led into an abscess in the lower lobe of the right lung. This was narrow, elongated upwards, and presented many of the characters of pneumonic abscess. It had no lining membrane, and communicated with numerous bronchial tubes. Around it the pulmonary tissue was of a greyish-white colour, softened but not granular. The diseased portion did not terminate by any distinct line, and occupied about two-thirds of the lower lobe, which was universally adherent to the diaphragm, and for about three inches to the costal pleura; the remainder of the lung was healthy. The mucous membrane of the stomach was pale and soft; the lower portion of the ileum red, and presenting some aphthous ulcerations: the mucous membrane of the colon was covered with fungous elevations, and numerous aphthous ulcerations. (Meath's Hospital Reports.)

In this case the diseased action had in all probability a double seat from an early period, namely, the lower portion of the lung and the integuments over the liver; it is remarkable for the double perforation of the diaphragm through its costal and thoracic portions, and for the direct communication made by the latter with the substance of the lung: the pleural and peritoneal adhesions prevented the escape of the matter either into the thoracic or abdominal cavity; a circumstance illustrative of the powers of nature in availing herself of diseased action to promote an ultimate cure.

Some authors have described gangrene as a result of hepatic inflammation; but facts are still wanting for the elucidation of this subject, and there can be but little doubt that, if it ever does occur, it must be a circumstance of extreme rarity. On this subject we shall quote from Mr. Annesley:—

"Gangrene has been remarked by many writers and teachers as one of the terminations of acute inflammation of the liver; but although we have observed this disease, and made post-mortem examinations of it, the number of which certainly has not been exceeded by any other inter-tropical practitioner, we have never seen a single case of gangrene of this viscus. We are inclined to believe that the appearances that have been taken for gangrene have been merely that black, congested and softened state of the organ which is sometimes observed in the more acute attacks of the disease, supervening to congestion, or at least this state of the viscus having speedily run into gangrene after the death of the patient; and therefore, if gangrene had actually existed at the time of dissection, it is to be considered as a consequence of death rather than a termination of the disease." (*Op. cit.* vol. i. p. 435.)

In the works of the modern pathological anatomists of Europe, the same infrequency of gangrene of the liver is observed; so that we may conclude that both in warm and temperate climates the termination of hepatitis by gangrene is of extreme rarity. Andral relates one decided case of gangrene of the liver, where the disease surrounded an abscess of the left lobe, and states that this is the only instance he has seen of gangrene of the liver. When we reflect on the vast number of dissections which this great pathologist has made, the fact of his having seen the disease but once is a decided proof of its rarity. Here is another circumstance in which the pathological relations of the liver differ remarkably from those of the lung, as, in the latter viscus, gangrene is a not unfrequent occurrence; but when we consider the greater liability to a stasis or effusion of blood in the pulmonary parenchyma, as compared with the hepatic, and also that in the lung the diseased portion is exposed to the action of air, we may find in these circumstances an explanation of the fact.

The effects of chronic inflammation on the liver are exceedingly various, and its results greatly influenced by the constitution or habit of the patient. Among them may be enumerated the different forms of hypertrophy, either partial or general, either of the red or white substance, or of both; induration; scirrhous or tuberculous tumours; and hydatids. We are far from believing that these latter lesions are always the result of an inflammatory process; as there is undoubted evidence that these new tissues may be the result of a lesion of secretion and nutrition, not induced by any previous irritation of the part; while, on the other hand, cases are on record where these different diseases appear to have been first brought about by an acute or chronic hepatitis. The following observations by Andral on this subject are highly philosophic:—

"There is scarcely one of the alterations of the liver which have been described which has not been designated by the name of hepatitis. In my opinion, there is hardly one of them which may not be the result of an irritation whose first effect was to cause an hyperæmia of the liver. For example, four individuals receive an external injury on the same region of the liver: in one an abscess is developed in the liver; in the second this organ becomes cancerous; in the third it becomes filled with hydatids; and in the fourth it

is atrophied. In all these four cases irritation has been manifestly the point of departure: but what has been its mode of action? It has deranged the normal nutrition of the organ; there its influence is confined: the predisposition of the individual has done the rest. On the other hand, I do not know an alteration of secretion or nutrition of the liver, not even a collection of pus in its parenchyma, that can be considered as necessarily arising from an antecedent process of irritation. I do not know one of which we can say that its formation has been necessarily preceded by a hyperæmia. What, then, does the word hepatitis express? Nothing more than the common link by which the different lesions of secretion and nutrition of the liver are often united. But this link is neither constant nor necessary; and if we have seen a case where an hyperæmia of the liver by external violence has been followed by the formation of hydatids, I may cite many other cases where nothing has demonstrated a similar point of departure, and where, from analogy, we would arrive at an opposite conclusion, and admit that the development of these entozoares is found connected with a diminished activity of the normal nutrition of the liver. (Précis d'Anatomie Pathologique, tom. ii.)

Observations are still wanting to establish the exact relative frequency of suppuration as the result of hepatitis in its acute and chronic stage; there can be little doubt, however, that this lesion is much more frequently the result of an acute than of a chronic inflammation.

With respect to the frequency of peritoneal adhesions it may be stated that these, which we have seen to be by no means constant in the acute disease, are commonly met in chronic hepatitis. In this disease the convex surface of the liver is generally found adherent to the parietal peritoneum by strong and organized adhesions. On its concave surface we may also meet adhesions with several portions of the abdominal viscera, though, as far as we have seen, these are not so frequent nor so general as those of the convex portion.

Symptoms of Hepatitis.—Inflammation of the liver has long been described as occurring under two forms, the *acute* and *chronic;* but although numerous cases will be met with where it would be difficult to declare to which of these species the disease belongs, yet in a practical point of view the division is convenient. Let us examine the symptoms, progress, and termination of the first or acute species.

Acute Hepatitis.—In the different elementary works on the practice of physic, the symptoms of this disease are described as occurring in a manner much more constant than the state of the science can permit us to believe, and in this way the student is misled, and gets a very false and contracted view of the affection. In fact, there is no one symptom mentioned that may not occasionally be absent; and, on the other hand, all may arise from other causes besides hepatitis. The symptoms may be considered as local and general; the *local* being, principally, pain, tenderness, and tumefaction; the *general*, fever, and lesion of the digestive and in some instances of the nervous and respiratory systems. Of these, the first two, namely, fever and lesion of the digestive function, are by far the most frequent, a circumstance to be expected when we recollect the general complication of hepatitis with gastro-intestinal disease. (See Gastro-Enteritis.)

Acute hepatitis may be generally described as commencing with that group of symptoms indicative of inflammation in the digestive system; in other words, the patient at first appears to be attacked with gastric or bilious fever, to which succeed, sooner or later, symptoms of the hepatic disease. There is often then high fever, the type being generally more inflammatory and less typhoid than that which results from a simple gastro-enteritis. The pulse is more frequently strong and full; there is thirst, a furred and yellowish tongue, and frequently vomiting, sometimes of a bilious, at other times of a dark-coloured matter. The bowels are commonly irregular or costive, and the discharges present a great variety of appearances according as the biliary secretion is more or less affected, and also according to the degree of complication with gastro-intestinal disease. The urinary secretion is also affected, being almost always scanty and very high coloured.

In addition to these symptoms we have the local indications of hepatitis, which are, principally, pain, tenderness, and tumefaction. The pain is felt in various situations, and occurs with various degrees of intensity. In some cases the patients describe it as a stitch in the side, aggravated by respiration or motion; in others the pain occurs about the cartilages of the lower ribs, or it may be felt in the lumbar region. Much has been written about the occurrence of pain in the right shoulder in cases of hepatitis; from our experience we would say that this is an extremely rare symptom, and one by no means pathognomonic of the disease, an opinion borne out also by the experience of Dr. Mackintosh (Elements of Pathology and Practice of Physic, vol. i.) in these countries, and of Andral in France. (Clinique Médicale, Maladies de l'Abdomen.) There can be no doubt that practitioners are often misled from attaching an unmerited degree of importance to the presence or absence of this symptom. Generally speaking, the pain is more acute when the inflammation is superficial,—a circumstance illustrative of the general law, that in parenchymatous inflammations the pain is more severe when the disease approaches or involves the surface of the organ.

The symptom which we regard as next in importance to the pain is the tumefied and tender condition of the organ. When the belly is flaccid and the intestines are empty, there is seldom much difficulty in detecting the hepatic enlargement. We then generally observe the right hypochondrium and the epigastric region full, and the edge of the liver can be felt descending more or less below the costal cartilages. Sometimes the ribs appear tilted out, but the intercostal spaces preserve their relative positions with respect to them; a point of great importance in the diagnosis between hepatic and pulmonary diseases. But where the belly is distended by either fæcal matter or air, it becomes extremely difficult to ascertain the enlargement of the liver. In such a case we would always recommend that a dose of opening medicine should be given, followed after some time by a purgative injection, after the operation of which the examination of the hepatic region will

be greatly facilitated. We shall also derive important information by the use of mediate percussion by means of the pleximeter, as recommended by M. Piorry, from whose recent work we shall quote.

"In some acute cases of hepatitis, or rather in sanguineous congestions of the liver, it has been easy to demonstrate, at the Salpêtrière, the Pitié, and at the Hôtel Dieu, that the liver is susceptible of great increase of volume, and that the dimensions of this gland diminish rapidly after a copious bleeding, and sometimes also by strict regimen, which by itself produces a loss of blood. The diminution of the hepatic organ varies from one to three inches, from above downwards, in the twenty-four hours; this is still greater in proportion as the blood drawn is more considerable. Not only has this fact been observed with old men in whom the venous circulation, embarrassed by disease of the heart, and particularly its weakness, explains the tumefaction of the liver, but also in adults, in cases of plethora and acute fevers. I could easily accumulate twenty observations to support this proposition. M. Vidal, one of the house pupils connected with my attendance, has just related to me three most remarkable facts taken most carefully. I shall confine myself to the following: A young man discharges a loaded pistol direct against the region of the liver; the ball, however, does not penetrate, which singular fact may be attributed to the presence of air between the muzzle of the piece and the ball, the pistol being applied to his clothes so firmly as to stop up the muzzle: his clothes are, however, torn, and the foreign body, after having violently contused the skin, falls at the feet of the wounded man. The first few days no accident of importance occurred; the circumference of the liver was bounded by a black line. The fourth day there was fever, flushed face, and dyspnœa very intense: this was referred to the liver; this organ above and below exceeded by an inch or more the former line of demarcation. A copious bleeding was tried; the next day the liver had resumed its former dimensions, and the severe symptoms disappeared. The cure was rapid. (*Piorry*, du Procédé Opératoire, etc. Paris, 1831.)

In using the pleximeter we should employ it over the epigastrium and hypochondrium, and also over the lower portion of the chest both anteriorly, laterally, and posteriorly. By this means, the extent of the hepatic tumefaction can be generally determined with ease. In some instances the tumefaction is more evident in the superior, in others in the inferior portions of the liver; when, however, the belly is much distended, this mode of observation is liable to many difficulties: thus, when the intestines contain much solid and fluid matter, we cannot estimate the extent of dulness inferiorly; and on the other hand, when they are distended by flatus, the liver is pushed upwards, under which circumstances the dulness of the lower part of the chest ceases to be a measure of the hepatic tumefaction.

Jaundice has been described as an attendant on hepatitis, but it is not a constant symptom. The patients have generally a slightly yellowish tinge, particularly in the face, similar to what is observed in gastric or bilious fevers, but very different from true icterus. In none of the cases observed by us at the Meath Hospital was there jaundice; and Andral relates numerous cases of hepatitis where this symptom was absent: it may, however, occur in acute hepatitis; but facts are still wanting to explain its absence in some cases, and its presence in others. Of one fact we are certain, that jaundice, when induced by inflammation, is much more frequently the result of a duodenitis than of an inflammation of the liver. From the known effect of a duodenitis, simple or complicated with gastric inflammation, in the production of icterus, (*Marsh*, on Jaundice, Dublin Hospital Reports. *Broussais*, Commentaries, &c.) it becomes an interesting question to determine how far the complication of gastro-intestinal inflammation in hepatitis may act in producing the symptom of jaundice. The following table of cases, taken from the writings of Andral, Louis, and from the report of the Meath Hospital, may assist in throwing some light on the subject. The first column states the condition of the liver, the second that of the gastro-intestinal apparatus and ducts, and the third that of the skin.

State of the liver.	*Digestive tubes and ducts.*	*Skin.*
Acute hepatitis	Healthy; ducts free	Jaundice.
Red softening	Healthy; ducts free	Jaundice (slight).
Red induration	Ditto ditto	Jaundice.
Numerous abscesses	Ditto ditto	Jaundice.
Abscess	Ditto ditto	Jaundice.
Ditto	Ditto calculus	Jaundice.
Ditto	Ditto healthy	Jaundice (slight).
Hepatitis with tumefaction	Chronic gastritis	Jaundice.
Hypertrophy	Chronic gastro-duodenitis; ducts free	Jaundice.
Vast abscess	Gastro-enteritis; ducts healthy.	Jaundice.
Numerous small abscesses	Slight enteritis; ducts free	Jaundice (slight).
Ditto ditto	Gastritis; gall-bladder atrophied; calculus in cystic duct	Jaundice (deep).
Numerous abscesses	Colitis; ulcerations of gall-bladder	Jaundice.
Hypertrophy	Chronic gastro-duodenitis	No jaundice.
Numerous abscesses	Chronic gastro-enteritis; duodenum healthy	No jaundice.
Ditto ditto	Gastritis	No jaundice.
Vast abscess	Ditto	No jaundice.

State of the liver.	*Digestive tubes and ducts.*	*Skin.*
Abscess and gangrene.....	.....	No jaundice.
Abscess	Duodenitis	No jaundice.
Chronic abscess in right	Chronic gastro-duodenitis	No jaundice, (slight yellowness at the commencement.)
Acute ditto in left lobe		
Vast hepatic abscess	Healthy	No jaundice.
Numerous abscesses	Colitis	No jaundice.
Red softening	Gastro-enteritis.....	No jaundice.

It is obvious, from the inspection of this table, that we cannot arrive at any explanation of the presence or absence of jaundice in cases of hepatic inflammation, from the consideration of the circumstance of gastro-intestinal complication. We see here cases of hepatitis with jaundice, in which the digestive tube was free from disease, and the same symptom with gastro-intestinal inflammation; and, in the cases of hepatitis without jaundice, the tube was healthy in some and diseased in others.

We may remark, while on this subject, that in hepatitis the biliary secretion is variously affected. In some it appears to be suspended, while in others, even after extensive suppuration of the liver, the gall-bladder has been found filled with healthy bile. We have observed these facts repeatedly in the Meath Hospital. Thus, in a case where a great number of abscesses were formed, the gall-bladder contained a perfectly transparent viscid fluid which did not coagulate by heat or the addition of nitric acid; the fluid was perfectly colourless, and in short presented all the characters of pure mucus. Notwithstanding this appearance of the contents of the gall-bladder, it is most remarkable that the intestines contained a quantity of yellow mucous and fæcal matter. In this case the mucous membrane presented indications of inflammation.

In two other cases, where the most extensive destruction of the liver had taken place, the gall-bladder was found to contain a bile healthy to all appearance. In the first of these a chronic abscess existed in the right, and a recent abscess in the left lobe. In the second, the organ was completely burrowed by numerous abscesses. In the different cases of hepatic abscess recorded by Louis, the greatest variety in the contents of the gall-bladder occurred. From these facts we seem justified in concluding that in acute hepatitis, and probably also in the chronic disease, we cannot form any exact diagnosis of the state of the liver from the appearance of the biliary secretions in the stools, inasmuch as in one case it is altered in its quality in a variety of ways, while in another, apparently the same condition of the organ, no perceptible change is observable. The truth is, that neither its presence, absence, nor alterations, give us any data to enable us to conclude as to the stage, extent, progress, or termination of the inflammation; and it is plain that under these circumstances the state of the stools will but little assist our prognosis. It is probable, however, that a very copious secretion of bile is more favourable than the contrary, as the inflammation of secerning organs is generally more inveterate when their secretion is arrested.

When hepatitis is once formed, it may terminate by resolution or by suppuration; or the irritation may continue in a modified manner, so as to be classed among chronic diseases of the liver. The indications of resolution are, in the first instance, the subsidence of the fever, the gastric symptoms, and the pain: this is followed by the disappearance of the tumefaction, which, though generally the last in the order of symptoms, often occurs with great rapidity. The infra-mammary and postero-inferior portions of the chest recover their clearness of sound on percussion; the dilatation of the side is no longer observed; the right hypochondrium and epigastric region lose the tension and fulness which occurred during the acuity of the disease. Although a few cases of suppuration without perceptible tumefaction of the organ have been met with, yet from our own experience we would say that the subsidence of the swelling is one of the most certain indications of the resolution of the disease, certainly more so than the disappearance of the fever and pain.

But when suppuration is to occur, we often find that the tumefaction, so far from diminishing, becomes increased, and this at a time when the fever is frequently changed in character and assumes a hectic type. Shiverings, more or less severe, are observed, with or without perspirations; the pulse becomes small and rapid; the countenance is pale, and a sour smell of the surface is perceptible. In one case we have observed a miliary eruption. There is generally a constant sense of weight and uneasiness in the right hypochondrium, and the pain has in some instances been found as it were to concentrate itself on a particular spot, probably corresponding to the principal collection of pus. After some time a fluctuating tumour may appear generally in the epigastrium or some part of the right hypochondrium, which is followed by discoloration of the integuments; but in other cases no such occurrence takes place, and we must be guided by the history of the case and the constitutional symptoms in forming the diagnosis of suppuration. Should the tumefaction persist, with a fever either of the continued or remittent type, we may suspect the formation of matter. When, however, the abscess forms so as to be perceptible by manual examination, we may observe the following conditions:—1, a generally enlarged state of the organ, in which, though no perceptible fluctuation exists, a doughy or boggy feel is communicated over a greater or less portion of the tumour; 2, distinct tumefaction below the margin of the rib; 3, a tumour in the epigastrium; and, 4, a bulging of the false ribs, with more than usual fulness of the intercostal spaces.

But it must be always borne in mind, that although the constitutional symptoms frequently undergo a remarkable change at the moment of suppuration, yet there are abundance of cases in which the change is scarcely if at all perceptible. To this we shall recur in speaking of the difficulties in the diagnosis of this disease.

The constitutional symptoms which are of

most value are, the supervention of night perspirations, shiverings, cold sweats, clamminess of the skin, and frequent fainting sensations. If this state has arisen in a case where it has been found impossible to affect the system with mercury, the diagnosis of abscess may be made with a great degree of certainty. In this last and most important statement, the best East India practitioners agree, and we have heard one gentleman, who occupies a high rank in the service, declare that he never yet knew a case of abscess of the liver in which ptyalism was induced, even although the largest quantities of mercury had been exhibited. Mr. Annesley says, "that there can be no doubt that the system will not be brought under the full operation of mercury, or that ptyalism will not follow on the most energetic employment of this substance, when abscess exists, although a slight tenderness of the gums will be produced by it." As far as our experience in the Meath Hospital has gone, we should say that the same circumstance holds good in the case of hepatic suppuration in these countries; but it is not peculiar to inflammation of the liver, as it is observed in other cases of intense visceral inflammation, in which, when ptyalism is induced, it is obviously the effect and not the cause of the reduction of the visceral disease; and we have no doubt that, from not properly estimating this circumstance, practitioners have erred with respect to the curative powers of mercury, and have done injury by the introduction of enormous quantities of this mineral into the system at a time when the violence of the local action prevents its specific and sanative effects on the economy.

The terminations of these cases of hepatic abscess are various. We have already alluded to the internal openings of the abscess in describing the pathological anatomy of the liver in a state of inflammation. In these cases the diagnosis is to be made on the same principles which Louis has laid down in speaking of peritonitis from perforation of the intestine: there is a sudden appearance of a new train of symptoms, accompanied in almost all cases by subsidence of the hepatic tumour. Thus, when the matter makes its way into the lungs by the mechanism which we have before described, a sudden and copious expectoration of puriform matter has been commonly observed: this is accompanied by a remarkable diminution in the hepatic tumour. Should these symptoms arise in a case where previously there had been no evidence of disease in the pulmonary parenchyma, the diagnosis may be still more certain. We had once an opportunity of making a stethoscopic observation of this most interesting lesion; the patient had recovered from an attack of that violent gastric fever accompanied by yellowness of the skin which we have described in the article Enteritis, when he again came under our care, labouring under symptoms of hectic fever, which proved ultimately to proceed from hepatic suppuration. This patient had a constant dry cough, which led us to make repeated stethoscopic examinations without our being able to detect any disease whatsoever in either lung: in less than twelve hours after the last stethoscopic observation the patient was suddenly seized with a feeling of suffocation, and began to expectorate large quantities of perfectly formed pus, of which in the course of the night he discharged upwards of a pint and a half. On the following morning the left lung, which the day previously had presented no morbid sign whatever either by the stethoscope or percussion, was found completely dull over the whole region of the lower lobe, with complete extinction of the respiratory murmur: there was no bronchial respiration, no resonance of the voice, dilatation of the side, nor displacement of the heart; nor was there any constitutional symptom indicative of either pleuritic or pneumonic inflammation. The patient continued to expectorate copiously for some days, and after the second day the morbid phenomena of the chest began to subside. We had, first, a mucous rattle audible at the root of the lung, which gradually extended over the dull portion, and was followed by a return of the respiratory murmur and resonance of the voice.

This stethoscopic observation, for the accuracy of which we pledge ourselves, is explicable only by the sudden filling of all the bronchial tubes with purulent matter. Let us observe, first, the sudden supervention of dulness and absence of respiration in a patient whose chest a few hours before presented no morbid phenomenon; this is accompanied by a copious expectoration of purulent matter, and there are no constitutional symptoms of pleurisy or of pneumonia. The absence of these symptoms is of great importance, because if the disease had proceeded from either of these lesions, it must have been of extraordinary violence, and would have certainly been accompanied by high constitutional and local symptoms. There was no dilatation of the side, or displacement of the heart, so that the diagnosis lay between hepatization of the lung and the sudden filling of the tubes with pus; but there was no bronchial respiration nor resonance of the voice, which would have occurred had it been hepatization, but which were absent because the large tubes were completely filled; and further, during the recovery of the patient the phenomena of the voice were exactly the reverse of those in pneumonic resolution. Thus, in the latter the resonance *decreases*, while in this case it *increased*;—in hepatization, because the air-cells recover their permeability, and the morbid subsides into the natural bronchophony;—in the case under consideration, because the emptying of the tubes permitted the return of the natural resonance of the voice. The resolution of pneumonia is accompanied by *decrease* of bronchophony, while in the case before us it was accompanied by *increase*.

In the majority of cases the matter discharged from the chest consists of well-formed pus. In a case, however, reported by Annesley, the opening of an hepatic abscess was followed by a violent purulent and bloody expectoration; the patient experienced a great sense of suffocation when he lay on his back, and on dissection a vast hepatic abscess was found communicating with the posterior portion of the lung. We have witnessed a case of the same lesion, in which, whenever the patient turned on the left side, a large quantity of purulent matter was discharged from the trachea.

It is hardly possible to confound this accident

with any disease of the lung, properly so called, particularly if by stethoscopic observation we have been satisfied of the previously healthy condition of the organ. The only cases which might possibly be confounded with it are the rare instances of the opening of an empyema into the lung, or the sudden secretion of purulent matter in quantity by the bronchial mucous membrane, of which a few instances are recorded.*

We have already spoken of the rarity of hepatic abscess opening into the general cavity of the pleura—a circumstance explicable by the adhesions which are formed between the two surfaces of the pleura, and which have the effect of directing the matter into the substance of the lung. From the rarity of these cases, it is difficult to state the symptoms of this lesion; yet in a case where a sudden occurrence of the signs of effusion into the pleura, accompanied by the disappearance of those of the hepatic abscess, were observed, the diagnosis might be made with a great degree of probability.

A not unfrequent termination of hepatic abscess is by the establishment of a communication with some portion of the digestive canal. The stomach, duodenum, and colon, are the parts in which the communication has been most commonly observed; and the circumstances which appear to influence the point of communication are principally the situation of the abscess and the general volume of the hepatic tumour. When the matter makes its way into the stomach, a sudden vomiting of purulent fluid, with subsidence of hepatic tumour, has been observed. When, on the other hand, it opens into the intestine, we have a sudden diarrhœa, followed by the same phenomenon. From instances of recovery under these circumstances, it seems fair to infer that a cure by cicatrization of the opening is not unfrequent; but the opening may become fistulous, and continue until the fatal termination of the case. This occurred remarkably in a case the particulars of which we shall just now detail, and which we before alluded to.

Rupture into the peritoneal sac seems to be more frequent than the opening into the pleura, a circumstance to be expected from the smaller degree of liability of this membrane to form adhesions. When it does occur, we have violent peritonitis supervening; but the full evacuation of the abscess is not a necessary consequence. The following unique case is highly instructive, as illustrating the rupture of hepatic abscesses both into the digestive canal and peritoneum.

A man, aged 39, was admitted into the Meath Hospital in August, 1828, labouring under hectic fever, with cough and nausea. He complained of great soreness from the fourth rib on the right side downwards. The hypochondrium was full and tender, and the side dilated one inch and a half, without distension of the intercostal spaces. Having recognised that the disease was hepatic, and suspecting that an abscess, deep-seated, had formed, we determined on performing the operation, first proposed by Dr. Graves, of dividing the abdominal parietes as far as the peritoneum, and keeping the wound plugged with lint. This was done, yet after six days had elapsed, no matter made its appearance. Soon after this a circumscribed tumour, evidently containing fluid, suddenly appeared between the median line of the epigastrium and the termination of the wound. It is important to remark that this tumour was not preceded by any local induration, but at once presented fluctuation. In consultation, however, it was determined to open it cautiously by means of a lancet, when, in place of matter, there was a gush of dark-coloured bile: the tumour disappeared, but fulness of the side continued. About four hours after this operation the patient expressed a sudden desire to go to stool, and passed two copious discharges of purulent matter with bilious fæces. This was followed by remarkable improvement, and the tumefaction rapidly diminished, so that in a few days all swelling of the right hypochondrium had disappeared. A diarrhœa, however, continued from the time of the disappearance of the tumour, and resisted every attempt to check it. Twenty-three days after the subsidence of the first tumour, a small hard swelling was observed in the epigastric region, about the size of an egg; this increased daily, and soon became fluctuating. On the thirteenth day after this, sudden and violent peritonitis set in, with subsidence of the epigastric tumour. He lived eight days longer, the diarrhœa continuing until his death.

From considering the various symptoms in this case, we made the following diagnosis publicly, before dissection; viz. 1. that the gall-bladder would be found to have been punctured, but that from peritonitis not having set in on that occasion, it was probable that its fundus was adherent; 2. that a chronic abscess would be found in the right lobe of the liver, which was the cause of the first symptoms, and in all probability of the persistent diarrhœa, from a communication remaining open between it and some portion of the digestive tube; 3. that a recent abscess would be found in the left lobe, which had opened into the peritoneum, and had caused death by peritonitis.

On dissection, the peritoneum was found of a deep-red colour, containing a quantity of serous fluid, in which was a large quantity of flocculi, forming masses having the consistence of jelly; the liver was generally adherent to the diaphragm and abdominal parietes, the adhesions of the right lobe being strong and ancient, those of the left soft and recent. In the left lobe an abscess of the size of an orange was discovered a little above its lower edge, and communicating with the peritoneal cavity by a fistulous opening, sufficiently large to admit a quill. In the right lobe we found a cavity of the size of an egg, empty, and lined with a semi-cartilaginous membrane of a dark iron-grey colour: this communicated with the duodenum by an opening large enough to admit the finger with ease. The gall-bladder presented superiorly a spot exactly corresponding to the size and form of a lancet puncture, which was covered by a thin transparent membrane. (Dublin Hospital Reports, vol. v.)

But hepatic abscess frequently proves fatal without any rupture internally or externally. In

* See *Van Swieten*, Comment. vol. iv. p. 60. Les Ephemerides des curieux de la Nature. *Baumes*, Traité de la Phthisie. *Hippocrat.* de morbus vulgaribus. *Andral*, Clinique Médicale.

these cases, as Broussais has well observed, the diseased action is seldom confined to the liver, but commonly occurs in some other organ, such as the gastro-intestinal mucous membrane, the lungs, or brain; of these the first is by far the most frequent. The actual state of pathology, however, does not permit us to adopt the opinion of Broussais as to the constancy of this complication, but the fact of its frequency is well established, and becomes of great importance in practical medicine. In all the cases of abscess of the liver recorded by Andral, there is but a single instance where the disease occurred without complication with lesion of other organs.

Suppuration of the liver has occurred without any of the characteristic symptoms of hepatitis. Thus, in the twenty-sixth observation of Andral, numerous abscesses, with redness and softening of the hepatic tissue around them, were found, yet the patient never had pain or tumour in the region of the liver, nor was he jaundiced: in this case there was complication with acute pneumonia and gastritis. In another case, where a scirrhous state of the stomach existed, numerous partial inflammations of the liver and an abscess were discovered; the patient never had either icterus or pain either in the hypochondrium or right side of the chest. The same author details a case where an hepatic abscess with gangrene was discovered after death, and in which all the characteristics of an hepatic affection were absent. The patient laboured under a chronic bronchitis and gastritis. We have known two cases where numerous abscesses were found in the liver, and in which the symptoms were merely those of continued fever, without any indication which could lead to the suspicion of the disease. Other instances might be quoted, but such cases are comparatively rare, and should not discourage the student, or render him too sceptical as to the powers of diagnosis.

In certain cases, the gall-bladder becomes distended with bile so as to form a tumour in various situations along the margin of the liver, representing in many particulars the phenomena of an hepatic abscess so completely, that the most eminent practitioners have been deceived in their diagnosis. It is extremely difficult to lay down rules by which this affection can be distinguished with absolute certainty. The obstruction of the ducts in most cases has been preceded by more or less of indications of hepatic disturbance, which it is impossible to say did not proceed from disease of the parenchyma of the liver. In the case which we have recorded, there was actually an hepatic abscess at the time when the distension of the gall-bladder occurred, and which was evidently its cause, so that in this case we had the local and constitutional symptoms of hepatic suppuration preceding the tumour, caused by the gall-bladder. In this case, then, the previous symptoms could only mislead us as to the nature of the tumour. We are not, however, aware of any other case where the tumefaction of the gall-bladder was preceded by an hepatic abscess.

In the first volume of the Dublin Hospital Reports, a most interesting case of enlargement of the biliary duct is recorded by Mr. Todd. The patient, a delicate girl, had been in bad health for some months previous to her death, during which she had had severe fever, with several relapses. When she was first seen by Mr. Todd, she was nearly insensible; she moaned incessantly, and frequently screamed, as if seized suddenly with acute pain; the skin was of a deep orange colour, and she was greatly emaciated. On examination, it was found that the abdomen was distended with fluid, and that the epigrastic and right hypochondriac regions were occupied by a tense swelling, which could be traced extending even below the umbilicus. A distinct fluctuation was perceptible at the most prominent point, a little below the ensiform cartilage, and a little to the right of the linea alba. This part was extremely sensible, and hence it was thought probable that a large abscess of the liver was here approaching the surface. With this impression, and anxious to afford immediate relief, Mr. Todd made an opening into the most prominent part of the tumour, when a thin fluid coloured with green bile escaped; a canula was then introduced with a view to prevent the escape of the fluid into the peritoneal cavity, when upwards of two quarts of a viscid green bile were discharged. After the operation, all the tumefaction of the abdomen had subsided, and no enlargement of the liver nor any other swelling could be detected. In the evening, however, the belly became swollen, painful, and tense, and the patient died on the following day. On dissection, the peritoneum was found inflamed, and containing a serous and bilious fluid: the liver was perfectly healthy, and the gall-bladder was found empty and contracted; but the hepatic and common ducts were found to be enormously distended, forming a sac, which still contained more than a quart of bile, and extending from the porta of the liver to the os sacrum, lying behind the duodenum, pancreas, and root of the mesentery, and stretching in a transverse direction, so as to cover the anterior surface of the right kidney, and the greater part of the left.

Andral relates several cases of distended gall-bladder forming an evident and fluctuating tumour in various portions of the abdomen. He has seen it, 1st, immediately below the cartilaginous portions of the right ribs; 2dly, lower down in the hypochondrium; 3dly, in the iliac fossa; and, 4thly, in the epigastric region. In a case of aneurism of the hepatic artery, which we have lately observed, the gall-bladder formed a fluctuating tumour very near to the right ileum, and the biliary ducts were found in a similar state to that described by Mr. Todd, only distended to a less degree. We believe that in all the cases, with the exception of that which we have recorded, there was jaundice; and it is probable that if the gall-bladder had not been punctured, and that the abscess had continued to press on the ducts, this condition would ultimately have been induced. In this case, also, it is very important to compare the appearance of the two tumours with a view to their diagnosis. That of the gall-bladder appeared suddenly, without being preceded by local pain or induration, but was at once fluctuating; that arising from the abscess of the left lobe was preceded by pain and induration; and fluctuation

did not appear until some days after its occurrence. This observation may be of utility in determining the point in future cases.

Chronic Hepatitis.—A great number of affections of the liver have been classed under this general term; such as induration, scirrhus, tubercle, hypertrophy, atrophy, &c., &c. In fact, we cannot say with certainty what the condition of the liver will be on dissection in a case where symptoms of chronic irritation have existed. We may, indeed, recognise an enlargement or an induration, but it appears rash to go farther than this. The liver, like other organs, however, being subject to chronic inflammation, we may recognise this condition, although we cannot say what particular alteration it may have induced.

The disease may set in with attack of acute hepatitis, or may from the commencement preserve a slow insidious character. In some cases there is more or less of fever, while in others the patient is apyrexic. The principal phenomena are various derangements of the digestive function, and it is often next to impossible to pronounce on the actual condition of the gastro-intestinal mucous membrane. In fact, chronic disease of the liver and of this surface are commonly combined. If, in addition to pain long continued in the region of the liver, increased by excitement, and accompanied by tenderness and tumour, we observe a sallow countenance, a dry skin, foul tongue, scanty and high-coloured urine, with occasional attacks of jaundice, we may safely make the diagnosis of chronic hepatitis.

In the less acute forms of the disease the local symptoms of an hepatic affection are often very indistinct, and the case presents many of the usual phenomena of a chronic gastro-enteritis. In addition to these, the pain about the right shoulder, when it does occur, the distension and oppression in the epigastrium and right hypochondrium, the bitter taste in the mouth, the sallow appearance of the countenance, the elevation of the shoulders, and the wasted state of the body, are the circumstances which in warm climates are relied on as indicative of hepatic disease.

It is stated that, when the surfaces of the liver are the seat of disease, the pain is more decided, and that, as the superior or inferior surface is chiefly affected, so in the first case the symptoms will be referred to the chest, and in the second to the stomach and bowels. An eminent writer says, that when the superior and exterior part of the right lobe is the seat of disease, the patient reclines with most ease on the right side, a dragging sensation being felt on turning to the left. From this sensation it is supposed that we may infer the existence of adhesions between the lobe of the liver and the right side.

Nothing can be more various than the terminations of this disease which have been observed. In fact, every one of the known organic changes of the liver has been found in cases where the patient laboured under symptoms of chronic hepatitis. Most of these certainly may be looked on as the results of the inflammatory action, the modifications in their nature being probably connected with the constitutional dispositions of the patient. In fatal cases, death is induced by various circumstances. In some cases an acute hepatitis supervenes upon the chronic, but in the majority the patient is cut off in consequence of disease of other organs. He may be attacked by peritonitis, either in consequence of the rupture of an abscess or of the gradual extension of disease to the serous surface: he may be attacked with enteritis or dysentery, which is a common termination in warm climates: pulmonary or cerebral disease may set in; and dropsy, with or without an affection of the heart, is not unfrequent.

The diseases with which chronic hepatitis has been confounded are principally the following: chronic gastro-duodenitis, scirrhus of the stomach, chronic pleurisy of the right side with empyema, and a neuralgic affection, of which the seat appears to be in the hepatic plexus.

In the articles Enteritis and Gastro-Enteritis we have alluded to the great frequency of the error of confounding the affection of the gastro-intestinal mucous membrane with that of the liver, and have dwelt on the injurious consequences of this mistake. With respect to the diagnosis between this disease and chronic pleurisy with effusion, we would say that there is hardly a case where the tact of the practitioner is more requisite than in this. We will suppose that he is called to see the case for the first time after considerable enlargement of the organ has occurred. He will often find that the history of the case gives him but little assistance, as the two affections are often accompanied by very similar symptoms; neither will he derive decided assistance from the stethoscope and percussion. In both cases we may have extensive dulness of the side, absence of respiration, resonance of the voice, or bronchial respiration. The side will be dilated in both, and the decubitus generally on the affected side. Neither will the existence of a tumour in the abdomen be unequivocal, as in the one case it may occur from hypertrophy of the organ, in the other from displacement.

From our experience we should say that the indication which is the most unequivocal is drawn from the state of the intercostal spaces. When the side is dilated by a fluid, as in empyema, the spaces are raised either to a level with the ribs or even protruded beyond them, and the side has generally a smooth and rounded appearance. On the other hand, when the dilatation is produced by a solid tumour, such as an enlarged liver, the reverse of this occurs; the pressure being exercised on the ribs, these are pushed outwards, but the intercostal spaces preserve their relative positions with them, and the side does not present any thing of the smooth and rounded appearance which we have described. (See Dub. Hosp. Rep. vol. v.) There are certain cases, however, where even this diagnosis is not applicable, such as where the patient is fat, the integuments œdematous, or the belly distended by fluid. Under such circumstances the difficulty of diagnosis is extreme.

It appears to us that the attention of British practitioners has not been sufficiently called to the frequency of the neuralgic affection of the liver which is commonly seen in hysterical subjects, and has been noticed by Andral in his Clinique Médicale. "We sometimes observe in the region of the liver severe pain, which cannot be accounted for after death by any lesion of the viscus or its

excretory ducts. These are cases of hepatalgia or hepatic colic. The circumstance just mentioned, and, moreover, the nature of the pains, their intermission, and the state of good health which often exists in the intervals,—all lead us to believe that these pains have their site in the numerous nervous filaments which are distributed in the liver, and which are derived either from the pneumogastric or the great sympathetic." (Maladies de l'Abdomen, t. ii. p. 26.)

The persons in whom we have witnessed this affection were females. In some of these a decidedly hysterical tendency existed, while in others this disposition was scarcely if at all indicated. In one case the condition of the spine lately denominated "spinal irritation" was present. The principal symptom in these cases was a constant pain in the region of the liver, which lasted for years, and was subject to occasional and violent exacerbations from various causes, such as mental emotion, fatigue, over-excitement, derangement of the bowels, or the occurrence of menstruation. During the exacerbation the pain is excruciating, —to all appearance more violent than that in the most intense inflammation,—and is generally accompanied with exquisite tenderness of the right hypochondrium. It has been stated to have been sometimes accompanied by a slight jaundice; but of this we never witnessed an instance, as, in the cases which we have observed, none of the usual symptoms of hepatic irritation, with the exception of the pain, existed. There was never fever, nor tumefaction, nor a bilious state of the urine, foulness of the tongue, thirst; nor were the alvine evacuations apparently affected, although the disease had been present for months or even years. Further intervals occurred during which the patient enjoyed a respite from pain, and presented no local nor general symptom of hepatic derangement. The diagnosis of this disease is then to be drawn from the violence of the pain, which is greater than that of inflammation, combined with the absence of fever, tumour, and the other indications of structural disease of the liver. We may also remark, that in several cases which have occurred under our observation the patients were subject to neuralgic affections in other situations, as the face or extremities: in one, severe dysmenorrhœa had long existed.

It is now some years since we were consulted in the case of a lady of luxurious habits and highly nervous temperament, who, while in India, had been attacked with pain in the region of the liver, which was supposed to arise from acute hepatitis. For this she was largely bled, both generally and locally, and brought under the influence of mercury, without relief. She was ordered to return to England, and on the passage was several times bled and twice mercurialized with the same intention. Some time after her arrival in this country, the pain became again severe, and occurred with violent exacerbations. Each attack had been treated as if it had been one of acute hepatitis, she having been repeatedly bled, leeched, blistered, and mercurialized. Temporary relief used to be afforded by the bleeding, but the disease constantly recurred; her constitution had become shattered, and she was constantly subject to the most violent hysterical paroxysms: the stomach had become so irritable that every thing was rejected, and the patient's sufferings were indescribable. Such was the condition of this lady when we were first called to see her; it was plain that the disease had resisted the most rigorous and long-continued antiphlogistic treatment. We found that there never had been any fever, that the right hypochondrium was perfectly supple, the lower part of the chest sounding clear, the tongue clean, the eyes and complexion clear, and the patient subject to neuralgic affections in other parts of the system. Under these circumstances, we determined on treating the affection as a neuralgia. Further bleedings were inhibited, contrary to the wish of the patient, who, as before stated, experienced temporary relief from them. She was put on a generous diet, sent to the country, and directed to use free doses of the carbonate of iron. This treatment proved perfectly successful, and in the course of a few weeks the lady was in the enjoyment of a state of health and comfort to which she had been a stranger for more than two years previously. We know of another case of a lady who had been actively treated for supposed hepatitis in the country without success. She was advised to come up to town to place herself under the care of physicians, for the purpose of undergoing a course of mercury. On examination, her medical attendant could find no evidence of hepatic disease except the pain. She was also treated by the carbonate of iron with complete success. Since then we have known several cases where the error of confounding this affection with inflammation has been committed, — an error always full of danger, but in Great Britain peculiarly unfortunate, from the empirical and almost universal employment of mercury in all hepatic affections. We have at this moment under our care a most deplorable example of the effects of this error, where the most profound lesions of the nervous system have been induced by the long-continued use of mercury.

Causes of Hepatitis. — The exciting causes of hepatitis may be enumerated as follows: residence in a tropical climate, intermittent or continued fever, gastro-intestinal inflammation, suppression of habitual fluxes, abuse of spirituous liquors, injuries of the side, wounds of the head, congestion from venous obstruction, suppression of cutaneous eruptions, exposure to cold, gallstones, &c.

Treatment. — When a patient has been attacked with symptoms of acute hepatitis, the disease being still in its early stages, and no evidence of suppuration present, the treatment should be commenced by a free bleeding from the arm, which, if the subject be robust, and the inflammatory fever high, should be pushed so as to produce some effect on the circulation. It would be always well to see the patient again in the course of from four to six hours, when, if the pain and oppression should have returned, and the inflammatory fever again be lighted up, the bleeding should be repeated without hesitation; a less quantity of blood, however, will generally answer the expected purpose. The bowels should be opened by a free dose of calomel, followed by saline medicine, and assisted by a purgative injection. The patient will thus be brought into the state best adapted

for deriving advantage from local bleeding; and we would impress strongly on the mind of the practitioner, that, although the exhibition of mercury is sometimes indispensable, he must place his chief reliance on general and local bleeding, both as the surest means of arresting the disease, and of ensuring the beneficial action of mercury should its exhibition become necessary. In warm climates it has been observed that in some cases the operation of bleeding is followed by faintness before a sufficient quantity is taken, and the blood is dark and grumous. In this case, as has been observed in other violent inflammations, (see *Rush* on the Yellow Fever,) the bleeding is soon followed by more violent excitement of the circulation, when a second bleeding is indicated, and the patient will bear the loss of a much greater quantity of blood; and this will then be found to present the buffy appearance in a much higher degree. The second bleeding also gives much greater relief to the patient.

From our experience we would say that general bleeding has not the same marked influence over hepatitis that it has over peripneumony, but appears principally useful in preparing the patient for local depletion, which seems to have the most direct influence on the disease. We have seen a case where upwards of a hundred ounces of blood were drawn at different times, and in which no apparent effect was produced on the inflammation until local bleeding was performed. In a robust adult not less than thirty leeches should be applied after the general bleeding, to the most painful part of the side, a measure which will be followed by still greater advantage if the bowels have been previously opened; and to ensure this result, purgative injections should be used to assist the action of the medicine administered by the mouth. When the patient can bear it, the greatest advantage will be derived from the application of a cupping-glass, fitted with an exhausting syringe over the leech-bites, by which means a much greater quantity of blood is obtained, and the subsequent oozing from the leech-bites generally prevented. As the blood flows, the exhaustion should be gently continued until the cup is full, when, if it is thought necessary to obtain more, the cup should be re-applied, and its margin surrounded with a cloth dipped in warm water; this causes a copious flow of blood.

In all cases it will be well to avoid, as far as possible, the oozing hemorrhage of leech-bites, as this exhausts the patient without any corresponding influence on the disease, and keeps him in an uncomfortable state. It is much better to make several applications of leeches successively, and to arrest the hemorrhage after the leeches have fallen off, either by the cupping-glass or the application of styptics, of which the best appear to be the solid nitrate of silver, or the muriated tincture of iron. In the Meath Hospital the application of powdered alum has been found very beneficial. After the hemorrhage has been completely arrested, the patient will derive great advantage from the application of warm poultices of linseed-meal or bread and milk over the affected organ; these, however, must be made light, as their weight in some cases proves distressing.

It has been the practice on the continent, and lately in Great Britain, to apply leeches to the anus in case of hepatic irritation, on the principle of depleting the system of the *porta* through the hemorrhoidal veins. We believe that the only cases in which this practice would be decidedly beneficial are those where the hepatitis is complicated with dysentery, or where it has supervened on the suppression of a hemorrhoidal flux; but in no instance should we be content with this mode of local depletion, as it is decidedly inferior to the application of leeches over the affected organ itself. In the dysenteric complication to which we have alluded, which is frequent in India, Mr. Annesley has found decided benefit from the application of leeches to the os coccygis.

The circumstances which point out that the general and local depletions have exercised a salutary influence on the suffering organ are the following:—the diminution of the inflammatory heat and of the oppression in the epigastrium and hypochondrium; the subsidence of the pain and tenderness; and, lastly, of the tumefaction, which is to be ascertained by the touch and by percussion of the lower part of the thorax and abdomen. (See article Abdomen, Explanation of.) Blisters may be now employed, but their use must never be resorted to while the inflammatory fever continues high, and they must be removed as soon as the patient begins to feel their stimulus. (See Derivation.)

When the disease occurs in persons of a broken-down constitution, and particularly in those who have long indulged in ardent spirits, it is scarcely necessary to observe that we must be much more cautious in the use of the lancet, and trust principally to local bleeding and counter-irritation.

After the employment of general and local bleeding, the production of ptyalism appears to be the most powerful means of subduing the disease; but, as we stated before, the practitioner must consider this treatment as secondary to that which has now been pointed out. There can be no doubt that the establishment of a free salivation is commonly followed by a rapid subsidence of the local disease, but it is also true that the accomplishment of this is commonly difficult, and often impossible. The more severe the disease, the greater will be the difficulty of inducing ptyalism; and the best mode of insuring the kindly action of mercury will be to reduce the inflammatory condition of the organ as far as possible before its exhibition. We have before stated the remarkable fact that in cases of suppuration of the liver it has been found nearly impossible to induce salivation.

It would appear that the safest mode of using mercury in this disease is by the exhibition of large doses of calomel at long intervals of time, as it is stated upon high authority that the remedy is thus much less apt to irritate the bowels, and that a less quantity of mercury, when thus exhibited, will sooner affect the system than a greater quantity given in divided doses. Ten grains of calomel, combined with one or two of opium, may be given twice in the day, or a scruple dose at bed-time, as recommended by the East India practitioners. It is stated that the combination of the calomel with some antimonial, such as the antimonial powder or James's powder, assists in

the speedy production of ptyalism. But of one fact we feel certain, that if after the use of mercury for three or four days free ptyalism be not induced, the remedy should be omitted.

In the acute stage of the disease the patient must be kept on a strict antiphlogistic regimen. Effervescing draughts may be allowed, and will often be found to be of great benefit when they act on the skin or kidneys. Mild saline purges with emollient injections should be employed; and the patient may drink a solution of cream of tartar or tamarind tea; and if there be much restlessness, an anodyne draught or twelve grains of Dover's powder should be exhibited at night.

But if, notwithstanding these means, the tumefaction continues, and the fever assumes a remittent or hectic type, the formation of abscess is to be dreaded. Under these circumstances we can no longer push the strict antiphlogistic treatment. The patient's strength must be supported by farinaceous and gelatinous foods, and the exhibition of wine in moderation, with vegetable tonics, will be advisable; poulticing must be diligently employed over the region of the liver, and we must endeavour to bring forward the abscess towards the surface as much as possible; when, in the event of a perceptible and fluctuating tumour being formed, it will be advisable to give exit to the matter as speedily as possible. This, however, is an operation of the greatest importance, and must never be undertaken without a full knowledge of the pathological relations of this disease.

We have already alluded to the rarity of adhesions between the surfaces of the peritoneum in cases of acute hepatic abscess. It is obvious that for the success or safety of the operation the adhesions of the peritoneum is a necessary condition; for in the event of their not existing, the matter will make its way into the peritoneal cavity, defeat the object of the operation, and almost inevitably destroy life. To obviate these difficulties, Dr. Graves has proposed a mode of proceeding which has been repeatedly acted on with success in the Meath Hospital. It is, without question, a most important addition to the surgery of the abdomen. In the fourth volume of the Dublin Hospital Reports this eminent and scientific physician has published a case of hepatitis, in which, notwithstanding the employment of active measures, evidences of suppuration occurred. There was no distinct pointing of abscess, so that it was judged impracticable to perform any operation which could reach the contained matter. Under these circumstances Dr. Graves, reflecting on the fact that certain deep-seated collections of matter may be induced to point towards a situation in which the resistance of the integuments and fascia is removed, proposed that an incision should be made over the most prominent part of the tumour, and carried through the abdominal muscles, so as to reach without dividing the peritoneum. This wound was kept open by plugs of lint, and poultices were applied over it. In a few days after a fit of sneezing by the patient, puriform matter in great quantity broke through the wound. The discharge continued copiously for a number of days, and the patient recovered perfectly.

We have since witnessed two instances where this operation proved successful. It would appear that it not only acts on the principle of removing resistance in a particular point, but also by inducing adhesions immediately below the wound, in all probability the result of its immediate irritation. In a case where numerous abscesses existed, and in which this operation was performed over the most prominent part, we found on dissection that the only point of adhesion of the whole peritoneal surface was that immediately below the wound, and corresponding exactly to its extent. Here recent coagulable lymph was effused, so that there can be no doubt that, had the patient lived longer, the contents of this abscess at least would have been evacuated through the external opening. The operation has every thing to recommend it; it is perfectly safe, productive of no distress to the patient, prevents the chance of effusion into the abdomen, and has been *proved* to be efficacious.

In a case of extensive and chronic hepatic abscess with great attenuation of the integuments, we proposed the performance of this operation; but it was determined by the attending surgeon to try the operation of a caustic issue in place of that proposed by Dr. Graves. After the separation of the slough, the matter did not show any disposition to escape. A small valvular incision was then made through the ulcer, which gave exit to a few ounces of puriform matter. This operation was immediately followed by excruciating pain in the abdomen and the most violent peritonitis, evidently arising from the escape of matter into the cavity, and proving that in this case the operation of the caustic had failed in producing adhesions.

When the abscess makes its way either externally or into the lungs or digestive tube, the strength of the patient must be carefully supported by light and nutritous diet, wine and tonic medicines, according to the circumstances of the case. The mineral acids may also be exhibited in the different tonic infusions, such as gentian, calumbo, or cinchona. Attention must be paid to the bowels; and it seems not impossible but that a gentle and graduated pressure on the organ might accelerate the cure by inducing a closure of the opening after the matter had been evacuated. The opening of the abscess into the serous cavities appears at first sight a necessarily fatal occurrence; and we believe that it has been so in every recorded case, with a single exception. In the report of the Meath Hospital before alluded to, a case is recorded in which death from the peritonitis was apparently prevented by the opiate and stimulating treatment first proposed by Dr. Graves in certain cases of peritonitis. In the case also of double abscess of the liver which we have recorded in this article, the patient lived for eight days after the rupture of the second abscess into the peritoneum, and it was evident on dissection that the process of cure had commenced, the gelatinous effusion in many places having assumed an appearance of layers, and presenting large blood-vessels in its interior.

In the treatment of *chronic hepatitis* the first great indication is to remove all unnecessary stimulation of the liver or gastro-intestinal surface. Fermented liquors and all kinds of stimulating food must be inhibited, and the diet of the patient

must consist of the simplest and most bland articles. The bowels are to be diligently but mildly acted on by gentle laxatives combined with mercurials, such as the hydrargyrum cum cretâ or the blue pill. In the commencement of the treatment we should apply every third or fourth day a dozen of leeches to the region of the liver, until we remove as far as possible the pain and tenderness of the organ. When this is effected, we should resort to counter-irritation, which must be persevered in for a considerable length of time. The best mode of proceeding is by the repeated applications of blisters over different parts of the organ, and by keeping up an eruption with a mild tartar-emetic ointment. If these means do not succeed, and if there is no contra-indication, it will be advisable to affect the system gently with mercury, which may be done either by the exhibition of a small dose of calomel and blue pill combined with Dover's powder, at night, or by mercurial inunctions practised over the region of the liver.

Where it is thought unadvisable to use mercury, from the constitution of the patient, the nitro-muriatic acid and the nitrous acid have been strongly recommended. It would appear that the best mode of using these remedies, particularly the first, is by the external application, either by sponging the surface, or by the foot-bath. The following is the mode in which this remedy is recommended to be used by Mr. Annesley. A mixture is made of eight ounces of pure water with four ounces of the nitric and four of the muriatic acid, of the strength of the London Pharmacopœia. Of this solution from two to five ounces are to be mixed with about three gallons of water at the temperature of 96°, in a high and narrow vessel, and the feet kept immersed in it for about half an hour every night before retiring to rest. If the bath does not cause a prickling sensation in the parts, the next is to be increased in strength. Advantage has also been obtained from sponging the trunk with a similar solution every night. The dilute nitrous acid drink has also been strongly recommended in cases of chronic hepatic affections. It possesses the property of producing a slight salivation, but is much slower in its operation than mercury. Taraxacum is a favourite remedy with many practitioners in these cases, but we are sceptical as to its efficacy.

After the disease has been subdued, vegetable tonics may be given to restore the digestive powers. The patient should wear warm clothing, and carefully avoid any error of regimen that may cause a return of the hepatic disease. In some obstinate cases we have known decided benefit from the use of the seton; and it is scarcely necessary to observe, that where the disease has supervened in a warm climate, removal to a more temperate region will be always advisable.

William Stokes.

LUMBAGO. (See Rheumatism.)

LUMBRICI. (See Worms.)

[LUPUS. (See Noli Te Tangere.)

MAGNETISM, (ANIMAL). (See Somnambulism.)]

MALARIA and MIASMA. The first of these words, and that which is now generally employed to designate a certain effluvium or emanation from marshy ground, we have adopted from the Italian. It is formed from the coalescence of the words *mala* and *aria* (*bad air.*) Miasma is a Greek word (*μίασμα*, from *μιαίνω*, *inquino*, *polluo*,) signifying originally contagion or pollution, but now with the occasional adjunct, marshy, not unfrequently applied to the same effluvium or emanation.

We infer the existence of the matter designated by one or other of these terms, as we do that of contagion in cases of disease which do not furnish a material transferable by inoculation, from certain effects on the animal economy; and we trace its origin to marshes from its having been observed, for a series of ages, that such effects are produced only in the vicinity of marshes, or at least are more abundant where vegetable matter and water are so situated with respect to each other, that a chemical reaction between them is possible. The observation of centuries having rendered us well acquainted with certain effects of malaria, we now reason conversely; and when we perceive the more familiar of them, particularly intermittent and remittent fevers, we infer its existence, and endeavour to discover its sources, which may not be very manifest.

The chemical and physical properties of malaria are unknown to us; the experiments which have been hitherto performed to illustrate its nature, or even to discover its presence, having furnished very unsatisfactory results. The air collected above the marshes of fort Fuentes was found by Gattoni as pure as that at the summit of Mount Leguone, if not more so; and M. Deseye obtained in the most confined marshes as on the most exposed hills, 78 parts of azote, 21 of oxygen, and one of carbonic acid, from an analysis of the air. It is true that MM. Thénard and Dupuytren found that the carburetted hydrogen gas disengaged from marshes left in the water through which it was passed a peculiar and very putrescible matter; and M. Julia discovered that dew gathered in the neighbourhood of marshes contains, likewise, a matter capable of fermentation; but there is no evidence that these substances are malaria; nor, were they proved to be so, do we know anything of their chemical properties but their capacity of undergoing the putrefactive process. Even the very obvious question, whether malaria is always one and the same, or a multiplicity of marsh poisons exist, is one which the present state of our knowledge does not enable us to answer decidedly. It has been argued that as the existence of such a poison is known only by its effects on the constitution, a variety in these effects should be deemed evidence of a difference in the poison. But it may be remarked that the diseases which are reputed to originate from malaria pass in the same subject into each other,—intermittents, for instance, into remittents, and inversely; and that, of a certain number of individuals residing in or merely visiting the same place at the same time, and consequently exposed to the same morbific cause, some are attacked with one form of fever, others with another. And we know that diseases certainly derived from one and the same poison, such as small-pox, exhibit great diversity of character in different persons. These circumstances favour the opinion that there are no differences in the

effects of this poison which may not be explained by a difference in the dose, or of the constitution on which it acts, or by the influence of certain agents, such as temperature, which modify its operation. The fact most in favour of a multiplicity of poisons is the occasional prevalence of one form of malarious disease, yellow fever for example, in the same situation for months, to the exclusion of all others. But as this occurs only under high temperatures, which at once promote the evolution of the poison, and modify the individual habits on which it operates, we would not consider it to furnish conclusive evidence, that the poison acting in this case is specifically different from the malaria which produces other forms of marsh fever.

[Of late, an attempt has been made by Professor Daniell to show, that sulphuretted hydrogen gas is the pestiferous agent: but as the notion has been exploded under the results of observation, it is unnecessary to dwell upon it.]

From what we have said on this obscure branch of our subject, it will be tolerably manifest that on the questions of the nature and simplicity or variety of malaria we possess no satisfactory information whatsoever; and that the legitimate objects of our present investigation are its sources, the laws of its propagation, the extrinsic circumstances which modify its influence, its effects on the animal economy, and the measures to be adopted to guard against these effects.

Though marshes, whether salt or fresh, are prolific sources of malaria, especially in a certain stage of the drying process under a hot sun, this poison is the product besides of various sorts of soil, to which the term marsh is by no means applicable. In the warmer regions of the earth these collections of low and dense brushwood, or of reeds and grass which are called *jungles*, are so familiarly known to be productive of malaria, that jungle-fever is as common a name for malarious disease in southern latitudes as marsh-fevers in Europe; and in the warmer regions of Asia, Africa, and America, even the larger and more open woods generate the poison under certain circumstances. Grounds which are alternately inundated and drained for the cultivation of rice, whether in India or Europe, have been found so injurious to the health of the cultivators and the neighbouring inhabitants, that by some governments, that of Russia for example, this species of cultivation has been prohibited. Wet meadow lands, especially in warm climates, and in temperate ones during seasons of unusual heat, have been proved to be sources of malaria; at least agues have been observed to prevail in districts in which no assignable cause for them existed but lands of this description. That the half-wet ditches of fortifications may produce malaria was shown by the result of filling up those of Bourg-en-Bresse, by which process those fevers ceased which had previously so affected the inhabitants, that one half of them were incapacitated from any occupation for a third of the year. The mud which is left by the drying of extensive ponds or marshes by the summer's heat, though invested at the time with no growing vegetation, but probably containing vegetable and likewise animal recrements, is capable of furnishing this poison. Lakes, especially if situated in flat countries, are indirectly sources of it, not by the moisture of their immediate margins only, but likewise by imparting a degree of the same quality to the adjacent country. Considerable portions of Hungary and tracts of land in France are rendered insalubrious from this cause. The mud left by the retiring tide in sea-ports and estuaries is productive of malaria in hot climates, as is evinced by the fevers with which the crews of boats are attacked in such situations; and we have seen reason to think that in certain seasons they are not perfectly salubrious in our own. The felling of woods, by which process land previously shielded from the sun's rays (and consequently damp) is exposed to their influence, is often followed by the prevalence of malarious disease in the district in which it is performed. Turning up lands which have long laid in pasture for the purpose of cultivating them is mentioned both by Volney and Rush as productive of malaria and its consequences. In the West Indies this has been found to be a very dangerous operation, Cassans describing it as sometimes producing fevers which resemble an absolute plague, the labourers even dying on the spot if they attempt to remain at night on the ground which they have broken up during the day. (*Macculloch* on Malaria, p. 112.)

The decomposition of vegetable matter in other circumstances than in connection with soil has frequently proved a prolific source of malaria. This is often exemplified by the pernicious effects of steeping flax and hemp; and Rush and others mention examples of fevers originating from the decomposition of coffee, potatoes, pepper, and other vegetables. The sickliness of ships from the leakage of sugar in a damp hold, and the occurrence of a fever which committed fearful ravages on the crew of the Priamus frigate from the action of bilge-water on chips and shavings left in the hold from the repairs of the magazine, as mentioned by Burnett, may be referred to the same class. Neglected sewers and drains have proved under a high temperature to be productive of fever by generating this poison.

If the preceding enumeration of circumstances under which the production of malaria takes place be examined, it will be found that vegetable matter and moisture are present in all the examples, and that animal matter is so occasionally. It is a proper subject of inquiry, and one which has given rise to some controversy, which of these elements are essential to the generation of the poison, and under what condition those which are essential should exist to possess the power of producing it.

With regard to water, it seems ascertained that its presence is necessary, if not at the surface, certainly below it; but that the quantity in the former situation should not be large. Many circumstances tend to prove that for the production of malaria only a small proportion of water should exist in any situation. It is remarked by African travellers, that in that country the evolution of malaria commences immediately on the falling of rain, and that of this the inhabitants are so conscious that they then retire to their houses, and endeavour to exclude even the least access of air. As the rains continue and the ground becomes thoroughly wetted, the sickness abates, to be renewed with greater violence on the retiring of the

rains, and the ground becoming dry. In the case of inundations, it is at their subsidence that sickness prevails, as was exemplified by the mortality among our troops under such circumstances during the Burmese war. In temperate climates, a marsh, the whole surface of which is thoroughly wet, is comparatively innocuous; but if partially or entirely dried by the summer's heat, it becomes extremely pestilential in autumn. Dr. Ferguson, a writer whose extensive opportunities have been aided by great power of observation, has furnished us with many instances, we cannot so justly say, of the small degree of moisture as of the excessive dryness which produces malaria in its most intense degree. "The army," says this writer, "advanced on to Talavera through a very dry country, and in the hottest weather fought that celebrated battle, which was followed by a retreat into the plains of Estremadura, along the course of the Guadiana river, at a time when the country was so arid and dry for want of rain, that the Guadiana itself and all the smaller streams had in fact ceased to be streams, and were no more than lines of detached pools in the courses which had formerly been rivers; and there they suffered from remittent fevers of such destructive malignity, that the enemy and all Europe believed that the British army was extirpated. The aggravated case of the disease differed little or nothing from the worst yellow fevers of the West Indies; and in all the subsequent campaigns of the peninsula, the same results uniformly followed, whenever, during the hot season, any portion of the army was obliged to occupy the arid encampments of the level country, which at all other times were healthy, or at least unproductive of endemic fever."* The writer can vouch from personal observation for the accuracy of this description; and he has repeatedly observed that cases of fever and ague abounded in parts of Estremadura so remote from the Guadiana or any stream, that no influence from visible water or dampness could be supposed to have a share in their production.

The following example taken from Dr. Ferguson's paper is strongly illustrative of the same facts, the effects of concealed water in producing the poison. The approach to the town of Ciudad Rodrigo is through a bare, open, hollow country, that has been likened to the dried-up bed of an extensive lake. Upon more than one occasion, when this low land, after having been flooded in the rainy season, had become as dry as a brick ground, with the vegetation utterly burnt up, there arose fevers among our troops, which, for malignity of type, could only be matched by those before mentioned on the Guadiana.

It will be readily understood, that though the surface of the soil which produces fever may appear dry or even burnt, yet as its occurrence takes place after rains, there is no proof that the presence of moisture is not necessary, but evidence of the very reverse, though it is shown that the dampness need not exist on the surface. The nature of the sub-soil, — its being, for instance, a dense clay, which by preventing percolation may detain the water within a short distance from the ground,—has probably some influence in engendering sickness; but there are many facts which prove that an impermeable subsoil is by no means essential to the production of the poison. The leeward shore of Guadaloupe, Dr. Ferguson informs us, so far from being impermeable, is a remarkably open and pure one, being mostly sand and gravel, altogether without marsh in the most dangerous places; yet it is inconceivably pestiferous throughout the whole tract. The soil of Walcheren, too, of the pestilential nature of which we have had such melancholy experience, is sandy, or a mixture of clay and sand.

These examples tend to confirm, so far as the water is concerned, the law of Dr. Ferguson, that the only condition indispensable to the production of the marsh poison on all surfaces capable of absorption is the paucity of water where it had previously recently abounded; a rule, to which he assures us there is no exception in climates of high temperature. It ought at the same time to be remarked, that though the formation of malaria is perfectly compatible, as the writer can testify from personal observation, with the degree of superficial dryness described by Dr. Ferguson, it may likewise consist with a degree of manifest moisture.

The necessity of the presence of vegetable matter has hitherto constituted an important part of the creed regarding malaria, but this necessity is questioned in the paper in the Edinburgh Philosophical Transactions, to which we have so often adverted. We have already mentioned Dr. Ferguson's opinion, that the only essential requisite for the formation of the poison is, that water should be absorbed by soil and then exposed to speedy evaporation; and the following example is given of the apparent absence of vegetable matter from a situation abundantly productive of malaria. "In Spain, during the month of May 1809, which was cold and wet, the army remained healthy; but in June, which was remarkably hot and dry, marching through a singularly dry rocky country of considerable elevation, several of the regiments bivouacking in hilly ravines which had lately been water-courses, contrary to the advice of officers who had served in the Mediterranean, several of the men were seized with violent remittent fever, (the first that had shown itself in the march,) before they could move from the bivouac the next morning; and this portion of the troops exclusively were affected with this disorder for some time. In this instance, the half-dried ravine having been the stony bed of a torrent, in which soil never could be, the very existence of vegetables, and consequently of their humid decay and putrefaction, was impossible, and the stagnant pools of water still left among the rocks by the water-course, and near which these men encamped, were perfectly pure. Yet this situation proved as pestiferous as the bed of a fen." Even in this situation, which furnishes the strongest argument that could be adduced for the author's departure from the established creed, it would perhaps be difficult to prove the total absence of vegetable matter, not only from the surface of the ravines, but beneath the rocky surface; and certainly there exist many facts which prove that vegetable matter is in the highest degree favourable to the pro-

* On the Nature and History of Marsh Poison, by Wm. Ferguson, M. D., &c. (from the Transactions of the Royal Society of Edinburgh), Edinburgh, 1821.

duction of malaria, if not essential to it. These are, the universal presence of such matter where the poison is generated, the cases adduced by Dr. Ferguson and similar ones excepted, if they are to be regarded as exceptions; the pernicious effects of the steeping of hemp and flax, for we presume it will not be argued that in this case the mere evaporation of the water, independently of the vegetable matter, would produce the poison; a similar result from the leakage of sugar and the decomposition of coffee, potatoes, pepper, &c., and the fever which committed such ravages on board the Priamus frigate from the action of the bilge-water on the chips and shavings left in the hold. A similar argument may be deduced from the wholesomeness of peat-bogs, which seem as well calculated as any marsh to produce malaria, excepting that the vegetable matter they contain being in a sub-carbonized state is not susceptible of decomposition. Since there is no reason to think that the evaporation of mere water will produce the poison, we are compelled to conclude that, if there was no vegetable matter present in the cases mentioned by Dr. Ferguson, some influence from mere terrestrial soil gave rise to the effects, which are usually owing to the presence of such matter.

The necessity of the putrefaction of the vegetable matter present when malaria is produced, is a different question from that which we have just considered. In by far the greater number of cases in which this poison is generated, there is no offensive smell whatever; it is true that a marsh or other source of malaria may be at once noisome to sense and pestilential, but it is frequently the latter without being the former. Although it has been shown that vegetable decomposition is instrumental in the production of the poison, if not strictly essential to it, yet the circumstance of its being generated in abundance without there being any perceptible smell, and in situations so dry that vegetable putrefaction, in the ordinary sense of the term, seems impossible, appears to prove that this decomposition is either in degree or kind different from putrefaction, though the two may coexist.

Malaria is generated in so many instances in which animal matter does not exist, that we must conclude that the presence of such matter is not essential to the formation of the poison; whether, when present, it increases the quantity or modifies the nature of the miasma, does not appear to be ascertained.

[On the evidences in regard to animal or vegetable putrefaction, or both being the cause of malaria, the writer has entered at great length in his *Human Health*, p. 64, Philad. 1844. He regards the affirmative as by no means proved.]

Heat is the extrinsic agent most influential in favouring the production of malaria in soils and situations capable of engendering it—an influence attributable probably to the effect of a high temperature in favouring the chemical action between organized recrements and humidity, and likewise to its accelerating the formation of the aqueous vapour which appears to be the vehicle of the diffusion of the poison. Hence, even the milder forms of malarious disease are observed only in seasons of a certain degree of warmth, rarely, for instance, arising in this country before the vernal or after the autumnal equinox; whilst the more intense degrees occur only in the higher latitudes, or, if seen in climates ordinarily temperate, it is during seasons of unwonted heat; and whersoever they exist, their prevalence is terminated by the cold of winter. It has often been observed, that a summer of unusual warmth, especially if occurring after a wet spring, causes intermittent and remittent fevers to reappear in districts whence they had long been banished by the improvement of agriculture,—an occurrence, of the possibility of which medical men should be aware; for when the malarious disease has made its visitation in the form of remittent, it has not always been discriminated from typhus, and confusion and controversies have thence arisen, not very creditable to all parties concerned.

The branch of our subject now to be considered, the propagation of the poison, is one regarding which we possess a considerable degree of irregular knowledge, consisting rather of detached facts presenting various unexplained anomalies, than of groups of corresponding facts from which the medical reasoner can deduce fixed and determinate laws. As might be supposed, the effect of the poison is in general more intense in proportion to the proximity to its source. This is probably owing to the more condensed state in which malaria exists near to the spot where it is generated; and it is remarked, that circumstances which favour its condensation add to the intensity of its effects. It appears to be on this principle that the vicinity of swamps is so much more pernicious in the evening or night than during the day. The influence of a high temperature in favouring the production of the poison, has already been pointed out; but it appears that during the portion of the day when the temperature is at its highest, the mobility of the atmosphere is so great, and favours so much the diffusion of the poison, that it is comparatively innocuous near the spot where it is generated; but in the more quiescent state of the air in the evening, though it is less abundantly formed, it is infinitely more pernicious. Its effect at these times is aided probably by its finding a powerful vehicle in the mists, which at night are observed to rest over low and marshy grounds. The more pernicious effect of the night-air in a pestilential country and season, however it is to be explained, is familiarly known, and is often exemplified by the fatality to soldiers of certain night-guards.

But to this general law, that malaria is more pernicious in proportion to the proximity to its source, there are important exceptions. In some instances it is found to affect places at some distance, especially if they are situated on an eminence, with the same if not greater intensity than those in the vicinity; thus the neighbourhood of Versailles is powerfully influenced by the marshes of St. Cyr; and at Neuville-des-Dames, above Chatillon on the Indre, fevers are more prevalent than close to the marshes where the malaria is produced. The stagnant water of Lake Aguano, we learn from M. Monfalcon, exhales deleterious effluvia, which are carried backwards to the north-east to two or three villages, and even to the convent of Comaldules, a league distant, and situated

on a high mountain. But the most extraordinary instance of this kind is mentioned by Dr. Macculloch, as occurring in Malta; the malaria which is produced on the beach beneath a cliff producing no effect on the spot itself, while it affects, even to occasional abandonment, the village situated above.

In explanation of circumstances of this nature, of which it were easy to multiply examples, M. Monfalcon supposes that the aqueous vapours in which the marsh poison is dissolved, are raised during the day by the heat and consequent expansion of the air, and are condensed and precipitated on the adjacent hills during the evening; whilst Dr. Ferguson conceives that so far from rising into the atmosphere, malaria has a peculiar attraction for the earth's surface, along which it creeps so as to concentrate and collect on the sides of the adjacent hills. We doubt whether either of these explanations is very satisfactory, and think it probable that the explanation of these facts is to be found simply in currents of air which sweep the surface of the marsh, so as to prevent the accumulation of the emanations there, and convey them in a state of condensation to the more elevated spots situated in the line of the atmospheric movements. The situation of certain elevated places, which have been powerfully influenced by marsh emanations, has frequently been observed to correspond with the direction of a manifest current of air which passed over the surface of a swamp. Chains of hills in Corsica and Italy, very far from morasses, but placed in their line, and in the face of a wind which carried to them their emanations, were entirely depopulated and rendered uninhabitable. Orlandi cites an analogous example: — the south winds passed over stagnant waters before arriving at some hills, the air of which they infected: these heights became salubrious only when Pope Paul V. had caused the marshes to be drained.

The distance to which marshy emanations may extend by gradual diffusion, has been calculated by Monfalcon to be 1,400 or 1,600 English feet of elevation, and from 600 to 1000 in a horizontal direction. In Europe these limits, he supposes, cannot be exceeded; but in equatorial regions the activity of the poison is much more extended; and in the West Indies, vessels at the distance of 9,000 feet from the marshy coast have felt their baneful effects. But when winds are in operation, their influence may extend to much greater distances than those mentioned. The case of the convent of Comaldules, which was infected at the distance of three miles, has already been quoted; but we know not any facts which teach us the extreme limits to which the poison may be transported. The distance will probably be influenced if the ground be such as to preserve the poison in a state of condensation instead of allowing it to be diffused; thus, a current of air sweeping up a valley, at the mouth of which the surface is swampy, will convey the poison to a greater distance than it could reach in a more open situation. An instance of this kind occurs in Ceylon, where the poison is conveyed many miles inland up a valley, whenever the sea-breeze blows in such a direction as to cross the swamps on the shore and enter its mouth.

We should take but an imperfect view of malaria did we consider intermittent and remittent fevers its sole results. Besides these its more familiar effects, organic affections of the spleen, liver, and mesenteric glands; similar affections of the stomach and intestines; dropsy, apoplexy, palsy, and idiocy, as manifested in the marshy districts of Tuscany, and in the cretinism of the valleys of Switzerland, are the effects of its long-continued application. Cholera, dysentery, and diarrhœa, are by many writers referred to its more brief agency, and there is reason to think occasionally with justice; intermittent neuralgia, there seems little doubt, is one of its effects, and to this formidable list some are disposed to add rheumatism, but the propriety of this seems doubtful. It is observed that the natives of marshy districts, who permanently reside in them, lose their whole bodily and mental constitution, contaminated by the poison they inhale. Their aspect is sallow and prematurely senile, so that children are often wrinkled, their muscles flaccid, the hair lank, and frequently pale, the abdomen tumid, the stature stunted, and the intellectual and moral character low and degraded. They rarely attain what in more wholesome regions would be considered old age. In the marshy districts of certain countries, for example Egypt, Georgia, and Virginia, the extreme term of life is stated to be forty; whilst we learn from Dr. Jackson, that at Petersburg, in the latter country, a native and permanent inhabitant rarely reaches the age of twenty-eight. [Dr. Jackson's remark must have been made, however, on inadequate statistical evidence, and probably on no statistical evidence whatever. If it were ever correct, it is utterly inapplicable to the Petersburg of the present day.] In the portions of Brittany which adjoin the Loire, the extreme duration of life is fifty, at which age the inhabitant wears the aspect of one of eighty in a healthier district. It is remarked that the inferior animals and even vegetables partake of the general depravation; they are stunted and short-lived.

By the progress of civilization, and consequently of agriculture, the domain of malaria is diminishing throughout the more enlightened portions of the earth. This is manifest in our own country, from many parts of which, where they formerly prevailed, agues have been banished. The draining of swampy lands; preventing in ponds or other damp situations the accumulation of putrid or putrescible vegetable or animal matter; and, in marshes situated near the sea, preventing by embankments the mixture of salt water with fresh, from which combination most pestilential emanations have always been observed to proceed, are the most efficient means of reclaiming malarious tracts, and consequently of preventing the production of the poison. But some lands are of so incorrigible a nature, the Pontine marshes for example, that the hand of man has hitherto been employed upon them in vain; and it is desirable to know, since we cannot prevent such districts from generating the poison, how its diffusion and pernicious influence may be in some degree checked. It is remarked that malaria has a peculiar attraction for certain surfaces, and that it is not disengaged from those to which it adheres, at least not in a noxious form; in other words,

they do not constitute fomites. The attraction of the poison for trees is great; and it has repeatedly been observed that not merely a few individuals, but the population of whole cities, situated in the most swampy districts in the world, have owed their security to a screen of woods interposed between them and the marshes. Facts of this nature suggest very obviously the propriety of planting trees in the vicinity of irreclaimable swamps. The floors of dwellings are supposed to have a similar attractive power over the poison; and hence, in malarious districts, the second stories of houses are found to be more salubrious than the first; and if from circumstances the first floor must be occupied, some security is afforded by having the bed a few feet elevated from it.

Nutritious diet, and that kind of general regimen which is most conducive to good health, should be observed by individuals exposed to the operation of malaria; and they should be especially careful to avoid, if possible, the vicinity of swamps in the evening.

JOSEPH BROWN.

[MANIA. (See INSANITY.)
MEASLES. (See RUBEOLA.)]

MEDICINE, (HISTORY OF*) — CHAPTER I.—*Introduction—Division of the history of medicine into three great chronological periods — History of medicine previously to its introduction into Greece—Origin of medicine — State of medicine among the Egyptians — Among the Assyrians — Among the Jews—Introduction of medicine into Greece—Chiron — Æsculapius — Machaon — Podalirius—The Asclepiades—Records in the temples of Æsculapius — Ancient inscriptions — Pythagoras—Democritus—Heraclitus—Acron — Herodicus—Gymnastic medicine.*

Although the primary object of this treatise is to present a view of the history and progress of practical medicine, yet it will be impossible to avoid entering occasionally into the consideration of the various theories and speculations which have so generally prevailed in the science. Medical theory and practice have been so intimately blended together, that it would be useless to attempt to separate them. The terms which are employed, in works of the most practical nature, are, for the most part, derived from the theory which was current at the time of their publication, and even the narrative of facts and the direct details of experience are, with a few exceptions, deeply tinged with the prevailing doctrines of the day, or with the individual speculations of the writer. Those who are versed in medical science, and who are acquainted with the relation which it bears to the other physical sciences, with the mode in which it is acquired, and the nature of the evidence on which it rests, will easily perceive that, in this department, it is peculiarly difficult to separate facts from hypothesis. It may, however, be asserted, that until this be accomplished, medicine can never be placed upon the basis of induction, and that this alone can give it that stability, which may entitle it to be regarded as a correct science. In its present condition it will be impossible to do more than to approximate to so desirable a state, but it will be a special object of attention, in the following pages, to endeavour to point out the limits between practice and theory, between facts, and the opinions that have been deduced from them.

When we take an extended view of the progress of medicine, tracing it from its scanty sources, in the most remote periods of society, and observe its course, as gradually augmented by the stores of Grecian and Roman learning, obscured by the darkness of the middle ages, and again bursting forth in the copious and almost overwhelming streams of modern literature, we are naturally led to separate the narrative into three divisions, corresponding to the three great chronological periods. The first of these will comprehend the history of practical medicine, from the earliest records which we possess, to the decline of Roman literature; the second will contain an account of the state of the science, through what are termed the dark ages, until the revival of letters; the third will commence with the establishment of the inductive philosophy, and be continued to the present time.

In tracing the history of this science from its earliest records, it will not be necessary to devote much time to a subject, which was formerly discussed with great learning and acuteness, viz. the origin of medicine. It may be sufficient to remark that, in proportion to the progress of civilization or refinement, attempts would be made to remove or alleviate the diseases, and to repair the injuries, to which the body is constantly incident. Subject as it is, at all times, to the influence of various noxious agents, and to a consequent derangement of its functions, to painful affections of various kinds, and to the loss or depravation of its powers or actions, we must conceive that mankind would be anxious to remove or relieve these evils. The means that would be employed must have been, in the first instance, extremely imperfect, and frequently ill directed. They may have been suggested by the effects of certain kinds of food, or by the operation of certain external agents on the body: some analogies may have been derived from the spontaneous actions of the system, by observing the natural efforts of the constitution to remove certain causes of disease, or to relieve the patient when suffering from their effects. Thus, in the earliest periods of society, mankind must have been aware of the relief which was obtained, in the derangements of the alimentary canal, by an evacuation of its contents, and would probably have discovered, incidentally, that certain vegetable substances promoted this operation. In the external injuries to which the body is subject, more especially in a rude state of society, means would early be had recourse to for procuring present ease from pain, or for removing the obvious danger to life, which would so frequently follow from various causes. It would soon be found that the pain was diminished by

* The writer of this Essay begs to remark that the references inserted at the foot of the page are to be regarded as the authorities for the facts and dates contained in the text; with respect to the opinions that are maintained, he is to be considered as alone answerable for them. Where he has conceived it necessary to dissent from, or to controvert, the doctrines of his predecessors, he has endeavoured to do it without acrimony or arrogance, and he trusts that his remarks will be received with the same spirit of candour in which they are offered. He thinks it necessary to state that wherever a reference is made to any book, the book so referred to has been examined by him.

excluding the wounded part from the air, or from other extraneous substances; that by certain modes of pressure, the flow of blood might be restricted; and that, in some cases an increased, and in others a diminished temperature, gave immediate ease to the patient, and tended to promote the ultimate cure. A rude species of medical and surgical practice of this description has been, in all cases, found to exist in newly-discovered countries, even when in the most barbarous state; while it has been observed generally, that the improvement in the healing art has been nearly in proportion to the advancement of the other arts of life, and to the gradual progress of knowledge on all subjects intimately connected with our existence or welfare.

The historical records which we possess respecting the progress of practical medicine are scanty and uncertain; but, so far as they extend, they coincide with the view of the subject taken above. The writers who have investigated this point with the greatest learning and assiduity inform us, that Egypt was the country in which the art of medicine, as well as the other arts of civilized life, was first cultivated with any degree of success, and that it had advanced so far as to have become a distinct profession. We are not, however, informed in what degree or to what extent that distinct appropriation was carried; whether medicine was made the exclusive business of certain individuals, who were regularly instructed for that purpose; whether it was attached to certain public functionaries, especially to the priests; or whether persons in different situations applied themselves to the practice of medicine, from a real or supposed superiority in their skill and in their knowledge of the treatment of diseases. The probability, however, is that the priests of the Egyptians were at the same time their physicians. This appears to have been the case among the Jews and the Greeks, who are supposed to have borrowed from the Egyptians many of their institutions; and indeed it seems to be the natural progress of society in its earlier periods, when the priests were generally the depositaries of knowledge of all kinds, and when they confined it as much as possible to their own use, for the purpose of maintaining their influence over the rest of the community.

From some remarks which are made incidentally in the Mosaic writings respecting the learning of the Egyptian priests, it would appear that it consisted, in a great measure, of the employment of magical incantations, and, so far therefore as it effected the cure of disease, must have operated through the medium of the imagination. This has been, in all cases, the first step in the art of medicine, if it may be so called, and its efficacy must have been in exact proportion to the ignorance and superstition of the people on whom it was exercised.

A circumstance respecting the practice of medicine in Egypt is mentioned by Herodotus, as existing when he visited that country, and which, it may be presumed, was transmitted from a much earlier period, that certain individuals treated certain diseases only. (Euterpe, sec. 84.) This division into separate branches might, at first view, seem to indicate a considerable progress in the practice of medicine, and it may undoubtedly have led to a degree of manual dexterity and of minute observation in certain departments. But, independent of any other consideration, we may rest assured, that the science must have remained in a state of complete degradation, when we bear in mind that it was the custom in Egypt, as it is in the present day among many of the nations of the east, to transmit the same occupation from father to son, through a number of successive generations. This practice, although it may be favourable to the perfection of an art, or even of a science, in some of its minute details, must furnish an almost insurmountable obstacle to its general improvement, or to the development of the powers and faculties of the human mind.

Although we are in the habit of considering Egypt as the parent of the arts and sciences, the empire of Assyria has been supposed, by many learned men, to possess a greater claim to this distinction. Perhaps the priority of invention may be justly awarded to the Assyrians, but the memorials which they have left behind them are so scanty, that the degree of excellence to which they arrived is almost entirely conjectural. The priests of this nation, as in all other cases, appear to have been the depositaries of all the learning of the times, and of that of medicine among the rest. We have reason to suppose that their practice consisted of little more than the dexterous application of magical arts, and such other means as tended to impress the minds of the people with a sense of their power over the operations of nature, while any actual information which they possessed was carefully concealed under the guise of mystery and superstition. (*Herodotus*, Clio, passim; *Enfield's* Hist. of Phil. v. 1. p. 25 et seq.)

In the writings of Moses there are various allusions to the practice of medicine among the Jews, and more especially with regard to the treatment of leprosy. The priests appear in this, as in other cases, to have been the practitioners; the treatment consisted principally in certain regulations for the purpose of promoting cleanliness and preventing contagion, together with various ceremonies, which, so far as they could affect the patient, must have acted entirely on the imagination. (Leviticus, chap. xiii.-xv.) So little is known respecting the state of the arts and sciences in the other countries of the east, at these remote periods, that it is scarcely necessary to allude to them in this place. We shall only remark that the imperfect and scanty notices which we possess on this subject would lead us to conclude, that the practice of medicine was even in a less advanced state than among the Egyptians, its progress being regulated by the greater or less degree of refinement or civilization of the respective countries, but in no case having advanced beyond the state of implicit credulity and gross superstition.*

* For further information respecting the state of medicine among the Egyptians and the other nations of antiquity, previously to the Greeks and Romans, the reader is referred to the following works. *Herodotus*, Euterpe et Clio, passim. *Diodorus Siculus*, lib. i. sect. 25, 82. *Plinius*, lib. vii. cap. 56, lib. xxix. cap. 1. *Plutarchus*, De Iside et Osiride. *Josephus*, Antiq. Jud. lib. viii. cap. 2, sec. 5. *Clemens Alexandrinus*, a Potter, Stromat. lib vi. p. 758. *Conring*. Introd. Art. Med. cap. 3, sec. 2, et De Hermet. Med. passim. *Barchusen*, Diss. No. 1, et 7

After having given an account of the state of medicine among the ancient Egyptians and other contemporary nations, as far as can be gleaned from the scanty records that remain on this subject, we must follow it into Greece, and trace its progress from the period of its first introduction in the remote and semi-fabulous ages of their *demigods* and *heroes*, until it acquired the rank of a science under the genius of Hippocrates. It is generally admitted, that although Greece cultivated the arts and sciences with so much success, yet, in the first instance, she borrowed them from the neighbouring nations; principally, as it would appear, from Egypt, and in some cases from Phœnicia. (Vide *Bryant*, ubi supra, et v. 2, p. 426 et seq. et alibi.) To certain individuals who migrated from these countries, the Grecks themselves were in the habit of referring the introduction of many of the most useful inventions, and during a considerable space of time all those who were desirous of acquiring a larger share of knowledge, either theoretical or practical, than was possessed by their countrymen, visited Egypt, as the great storehouse of science and learning. It is from this cause that we find so much analogy between the divinities that were worshipped in the two countries, as inventors or patrons of the various arts and sciences. For although they acquired new names on their being transferred into Europe, yet their attributes, and even their forms, clearly demonstrate their origin. This is particularly the case with respect to medicine, so that in the Orus and Thouth of the Egyptians we may recognise the prototypes of the Apollo and Hermes of the Greeks. (*Haller*, Bibl. Med. Pract. lib. 1, sec. 7, 8. *Hundertmark*, in Ackermann, Opuscula, Exerc. No. 1.)

It is not until comparatively at a late period, approaching to that of the Trojan war, that we find the names of actual personages who practised medicine in Greece; and of these, it is probable that some were natives of either Africa or Asia, who brought with them the information which they had acquired in their respective countries. Of those whose history is better known, and who were acknowledged to be of Grecian origin, it was the general custom to travel into Egypt for the purpose of obtaining a knowledge of their art, and with this view they submitted to a system of rigid discipline, and to a variety of irksome and burdensome ceremonies; and after all this laborious process, so far as the science of medicine is concerned, the result seems to have been little more than the knowledge of magic and incantations, with some rude notions respecting the application of external remedies for the cure of wounds and of cutaneous diseases, with a very imperfect idea of the anatomy of the human body, and a very inadequate conception of its functions. (*Herodotus*, Euterpe, passim. *Diodorus Siculus*, lib. 1. passim. *Josephus*, Antiq. Jud. lib. viii. cap. 2, sec. 5. Odyss. xix. 656 et seq. Æneis, vii. 753 et seq.)

The first native of Greece who is more particularly singled out, as having introduced the art of medicine among his countrymen, is the centaur Chiron. There is much mystery attached to his character and to every thing connected with him, but what we may consider as the most probable conclusion is, that he was a prince of Thessaly, who lived about the thirteenth century before the Christian æra; that he was distinguished above his contemporaries for his knowledge of the arts of life, and that, after the manner of his countrymen, he was frequently seen on horseback, so as to give rise to the fabulous account of his compound form. He is particularly celebrated for his skill in medicine and in music, a combination, it may be remarked, that was said to have existed in many other individuals. We are not informed by what means he obtained his superior knowledge in medicine, but there are various circumstances, which lead us to conclude, that it was at that time regarded rather as a part of the education of all men of rank, than as attached to a particular profession. We accordingly find that he instructed the Argonauts in medicine, and the heroes who were engaged in the siege of Troy, and that all the kings and warriors of that period were more or less acquainted with the treatment of wounds, and even with the practices which were adopted for the cure of internal diseases. (Ilias, xi. 636 et seq. *Sprengel*, t. 1, p. 112, 13. *Ackermann*, per. 1, cap. 3, sec. 25—40.)

But although Chiron has the reputation of having introduced the art of medicine into Greece, it is to his pupil Æsculapius, that by the common consent of antiquity, is ascribed the merit of having first devoted himself to the cultivation of medicine as a science, and of having made it a distinct object of pursuit. The improvements which he made in the art were so considerable, as to have induced his countrymen, after his death, to pay him divine honours, to designate him as the god of physic, to erect temples to him in various parts of Greece,* and to derive his origin from Apollo himself. His history, when divested of all the fabulous appendages that were attached to it by his contemporaries, appears to be that he was a native of Epidaurus, that he was exposed in his infancy, probably in consequence of his illegitimate birth, that he was accidentally discovered by a shepherd, and placed under the care of Chiron. His death was said to have been caused by the jealousy of Pluto, in consequence of the number of individuals whom he rescued from the grave; from which tale we may at least conclude that his reputation as a successful practitioner must have been much higher than that of any of his contemporaries.†

According to the custom of that age, he trans-

Gruner, Analecta, Diss. 1. De Ægyptiorum Veterum Anatome. *Schulz*, Hist. Med. p. 1, sec. 1. *Clerc*, Hist. de la Méd. par. 1, liv. i. chap. 1—8. *Sprengel*, Hist. de la Méd. par Jourdan, sect. 2, ch. 1—3. *Enfield's* Hist. of Phil. v. 1, p. 86, 7, et alibi. *Pauw*, on the Egyptians and Chinese, part 1, sect. 2. *Bryant's* Analysis, v. 2, p. 324 et seq. et in multis aliis locis. *Cabanis*, Révol. de la Méd. ch. 2, sect. 1. *Ackermann*, Instit. Hist. Med. p. 1, c. 1, 2. *Lauth*, Hist. de l'Anatomie, liv. i. *Blumenbach*, Introd. in Historiam Medicinæ Litter. sect. 1—3.

* *Pausanias*, lib. i. cap. 21; ii. 10; ii. 13; iii. 22; iv. 31; vii. 21; vii. 23; vii. 27; viii. 25. *Strabo*, lib. viii. p. 592; ix. 668; xiii. 899; xvi. 1097, a Casaubon, Amst 1707. *Clerc*, part 1, liv. i. ch. 20.

† *Diodorus Siculus*, lib. iv. sec. 71. *Hyginus*, fab. 49 et alibi. *Clerc*, part i. liv. i. ch. 11—16. *Ortelius*, Capita Deor. lib. ii. in Gronovii Thes. Græc. t. 7, p. 278 et seq. *Montfaucon*, Antiq. v. i. book ii. chap. 1, 2. *Sprengel*, t. i. p. 119 et seq. *Ackermann*, per. 1, cap. 3, sec. 41—59; and especially the second dissertation in his Opuscula by Günzius and Richter.

mitted his profession to his sons Machaod and Podalirius, who accompanied the Greeks in the Trojan expedition, and are celebrated in various passages of the Iliad for their medical skill.* From the incidental mention that is made by Homer and the early Greek writers of the nature of the remedies that were employed by these individuals or their contemporaries, it will appear that their practice was principally surgical, and nearly confined to the treatment of wounds, and that, with respect to internal diseases, they were for the most part conceived to be the immediate infliction of the Deity, and were therefore abandoned as incurable, or at least were to be obviated only by charms and incantations, and that the arts of magic formed no inconsiderable part even of their surgical practice. (Ilias xi. 636 et seq. Odyss. xix. 456 et seq.)

The practice of medicine remained for a considerable time hereditary in the family of Æsculapius, and in a great measure confined to it. His descendants obtained the name of Asclepiades; they were the priests of his temples, and presided over and directed the rites and ceremonies.—(*Sprengel*, t. i. p. 168 et seq.) These temples, indeed, became a species of hospitals, to which patients resorted from all quarters for the relief of the diseases with which they were affected. Under the direction of the priests of these temples they underwent a variety of ceremonies, the immediate effect of which must have been principally upon the imagination. Some, however, of the practices which were enjoined were of a dietetic nature, and were directly conducive to temperance and cleanliness; such as frequent ablution, and the abstaining from certain kinds of food. To these if we add that the temples were generally erected in healthy situations, that the patients enjoyed rest and leisure, and that the mind was interested by a succession of new and pleasing impressions, we may suppose that they would be placed under circumstances, not a little resembling those which are found so conducive to health by the invalids who frequent the medicinal springs and other analogous establishments of modern times. (*Clerc*, part i. liv. ii. ch. 2–6. *Schulz*, par. i. sect. 2, cap. 4. *Sprengel*, t. i. p. 153 et seq. *Cabanis*, p. 59, 60.)

Although the accounts that have been transmitted to us respecting Æsculapius would lead us to conclude that he was a real personage, who actually possessed a greater degree of medical skill than any of his contemporaries, yet his whole history is so involved in fable and mystery, that it is impossible to obtain any correct idea of the details of his practice. It has been observed above that it was probably, in a great measure, surgical, and even confined almost exclusively to the cure of wounds or recent injuries. The treatment of these may be considered so far judicious as it was simple; it consisted in removing all extraneous bodies, in placing the parts as much as possible in their natural position, in fomentations and ablutions, and in the application of certain vegetables which were supposed to be possessed of balsamic or styptic properties. Wine and other articles of a more stimulating nature were also used, while oleaginous substances were employed nearly with the same intention as in modern times, to defend the part from the air or other external agents, together with bandages and other means of mechanical support. We have no distinct evidence how far internal remedies were administered; for the most part they relied on magical arts and incantations, and although we have reason to believe that certain vegetable products were occasionally employed as internal remedies, we are scarcely able to discover what was the object of the practitioner, and we are frequently unable to ascertain what were the plants that were employed. (*Celsus*, lib. i. præf. *Plinius*, lib. xxix. cap. 1. *Clerc*, part 1, liv. i. ch. 15. *Schulz*, p. i. sect. 2, cap. 4. *Sprengel*, sect. 2, ch. 4, 5. *Cabanis*, ch. 2, § 1.)

But scanty and imperfect as is our knowledge of the state of medicine in the age of Æsculapius, after his death and that of his sons Machaon and Podalirius, we have a long period, extending even to several centuries, during which we have still less information respecting the history and progress of the science. We have not a single improvement of any importance recorded as having taken place during this long interval, nor have we the names of any individuals transmitted to us, who were of sufficient eminence to be distinguished above their contemporaries. We learn that the practice of medicine was entirely confined to the Asclepiades, who were the guardians or superintendents of the temples that were erected in honour of Æsculapius. It may be inferred from the very scanty materials which we possess on the subject, consisting entirely of allusions or indirect accounts, scattered through the works of the older poets and historians, that they sedulously kept up the system of rites and ceremonies, which had been handed down to them from still more ancient practitioners, that they carefully preserved to themselves the sole management of the art over which they presided, and we cannot doubt made use of the influence which they acquired over the minds of their contemporaries for the purposes both of gain and of ambition.† But although we regard the general system of the priests of Æsculapius to be nothing more than a tissue of mystery and delusion, it is very probable that the ample opportunities which they possessed of witnessing the phenomena of disease in all its forms might enable them to obtain much valuable information respecting the nature and tendency of the morbid actions of the body, and of the effects of certain agents upon them. Men possessed of superior talents and sagacity would naturally profit by these advantages, and we accordingly find that some of these temples acquired a high degree of celebrity, in consequence of the supposed skill of the priests that were attached to them. These opportunities of acquiring experience were much facilitated by a practice, which generally prevailed among the patients, whenever they were cured of their diseases, of depositing in the temple a votive tablet, on which was inscribed a narrative of the case, including a statement of the symptoms of the dis-

* *Clerc*, part 1, liv. i. chap. 17. *Sprengel*, t. i. p. 127 et seq. *Goulin*, "Anciens Médecins," in Encyc. Méthod. 'Médecine;" this article may be advantageously consulted on the subject of the Greek and Roman physicians.

† *Lucian*, in his "Philopseudes," gives an account of various medical superstitions which prevailed at a later period, many of which were probably transmitted from the empirics of antiquity. See Tooke's Trans. v. i. p 87 et seq.

ease, and the means adopted for its removal. The temples were thus converted, to a certain extent, into schools of medicine, and as these records were religiously preserved, they became the repositories of much valuable information, which must have gradually led to an improvement in the art. Of the numerous temples that were dedicated to Æsculapius, there were three which acquired peculiar celebrity, those of Cos, of Gnidos, and of Rhodes; we are informed that Hippocrates made great use of these records, and it has even been supposed that one of the treatises which is generally ascribed to him, "Coacæ Prænotiones," was composed from the records which he procured from the temple of Cos.

Some ancient inscriptions have been discovered by the researches of the learned antiquaries of the last century, which would appear to consist of memorials of this kind; and from these specimens we may form some idea of the nature of the information that would be conveyed by them. For the most part they state little more than the name of the disease, together with a very brief account of the means adopted for its relief, which in many cases depended entirely upon certain ceremonies, and in others upon the application of remedies which, we may venture to assert, could have no physical operation. (*Gruter*, Corp. Inscrip. a Grævio, pl. 17 et alibi. *Ackermann*, Opuscula, Diss. 3. sect. 3, by Hundertmark and Carpzov.) Still, however, some experience of the nature and treatment of disease might have been conveyed by their means, and of this we may presume that an individual of a sagacious mind would have availed himself for the improvement of his art.

Among the few circumstances that are transmitted to us respecting the principles and practice of the Asclepiades, we are informed that the priests connected with the two rival establishments of Cos and Gnidos devoted their attention in some measure to different objects; those of the former assumed more of a philosophical cast, attempting to unite reasoning with experience, while the latter attached themselves solely to the observation and collection of mere matters of fact. Hence it would appear that a foundation was thus early laid for the two great sects of the Dogmatists and the Empirics, which long divided the medical world, and the influence of which is, even at this day, not altogether destroyed. We may remark, however, that the philosophy of the school of Cos, if it may be so called, was founded upon such totally incorrect principles, and upon so fallacious a basis, that little immediate benefit was derived from it, and that it was only useful so far as it might lead them to exercise their intellectual powers, and enable them to reason more correctly on medical subjects. By the mode in which Hippocrates speaks of certain practices, such as bleeding and the administration of emetics, purgatives and other analogous medicinal agents, we may infer that they were in common use among his contemporaries, and probably had been so for a long time before him. We may in some instances obtain a knowledge of the vegetable substances that were employed in these early ages, as well as of the individuals who introduced them into practice, by the names which were afterwards imposed upon them by the ancients. It must indeed be obvious that the indication derived from these names is far from being decisive as applied to any particular case, but we derive a general inference from it as to the nature of the articles employed, while they serve to point out the persons who were supposed to have been the most eminent for their skill or their science.

Some centuries had elapsed, during which the practice of medicine continued altogether in the hands of the priesthood, and under their control had remained nearly stationary. It had been exercised, for the most part, for the purpose either of direct emolument, or for the still more selfish purpose of maintaining their influence over the minds of the people, when it began to be cultivated by a different description of persons, much more likely to produce a spirit of improvement, and from whom in reality it derived its first impulse. It was during the sixth century before the Christian æra that the genuine principles of philosophy first made their appearance in Greece, and among the other topics which then became the subject of investigation, the powers and functions of the human body were examined with considerable attention. This led to an inquiry into the nature and cause of diseases, and to the means of their removal; and although a long period elapsed before much actual advance was made in the knowledge of pathology or of the practice of medicine, yet we observe the effect of a more correct mode of reasoning, and may perceive that the strong-holds of mystery and superstition, although not destroyed, were at least in some degree weakened. (*Sprengel*, sect. 3, ch. 1.)

The celebrated name of Pythagoras may be mentioned as the first of this class respecting whom we have any accurate information, and even his history is enveloped in much obscurity. We may, however, conclude with certainty that he devoted the greatest portion of a long life to the pursuit of natural knowledge, that he made many considerable advances in various departments of science, and among others in the knowledge of the structure and actions of the human frame. It has been supposed that he dissected the bodies of animals, and hence acquired a certain acquaintance with anatomy, and that he publicly taught what he knew on this subject to a large assembly of students, who came from all the civilized parts of Greece and Italy to Crotona, where he established his school. We are informed that, for the purpose of acquiring knowledge, he travelled into those countries which, previously to his time, were regarded as the depositaries of knowledge, particularly Egypt, where he is said to have passed no less than twenty-two years, and probably also Chaldæa and some parts of Eastern Asia. From what has been stated above, we may form some conception of the nature of the knowledge that he would obtain from these sources, and we may conclude that he must have been possessed of a very superior mind to have been capable of extricating himself from the trammels of superstition and bigotry in which every thing connected with those countries was involved.*

* *Diogenes Laertius*, lib. viii. cap. 1-50. *Cicero*, de Fin. v. 29. *Valer. Maximus*, viii. 7. *Ælianus*, Hist. Var. iv. 17. *Clemens Alexandrinus*, Stromat. lib. i. p 354-7. *Fabricius*, Bibl. Græc. lib. ii. cap. 12. *Enfield*, vol. i. p. 422 et seq. *Ackermann*, Instit. Per. 2, cap. 4, 5 Opuscula, diss. 4, a Kühn.

We are scarcely able to determine in what degree he directly improved the practice of medicine; it is probable, however, that, as he did not make it his profession, but studied it only in connection with the other branches of natural philosophy, the actual additions which he made to it were not considerable. (*Sprengel*, t. i. p. 337 et seq.) This we may also conclude to have been the case with many of his pupils, who were among the most justly celebrated philosophers of that and the succeeding age. They may all of them be regarded as belonging to the school of Pythagoras, inasmuch as they cultivated natural knowledge by means of observation, and even occasionally of a rude kind of experiment; and although none of them were exclusively devoted to the study of medicine, yet they gradually and indirectly contributed to its advancement, so as to prepare the way for one of those great and commanding geniuses who occasionally make their appearance, and by their intellectual ascendency produce such important revolutions in the world of science: it is unnecessary to state that we here allude to Hippocrates.

During the interval from Pythagoras to Hippocrates there are few names that require any particular notice as improvers of medicine. Democritus (*Clerc*, p. 96–101. *Enfield*, vol. i. p. 422 et seq. *Barchusen*, diss. No. 1. *Sprengel*, t. i. p. 261-6) and Heraclitus (*Clerc*, p. 95, 6. *Sprengel*, t. p. 266–9. *Enfield*, vol. i. p. 436 et seq.) were among the most illustrious followers of Pythagoras, but they became famous rather from the ingenuity with which they supported their peculiar hypotheses than from the additions which they made to actual knowledge. They applied respectively their favourite doctrine of atoms and elements to explain the phenomena of disease, and even the operation of remedies; but, it is unnecessary to say, with little real advantage. The former of these philosophers, however, deserves honourable mention from the attention which he paid to the study of comparative anatomy; and it has been conjectured that he so far rose superior to the prejudices of his age as to venture upon the dissection of the human subject.

The name of Acron is mentioned by Pliny (Lib. xxix. cap. 1) as among the first who attempted, upon any general principles, to apply philosophical reasoning to the science of medicine, but we have scarcely any knowledge of his history or character, nor have we any memorials left of the principles which he adopted. (*Clerc*, part. i. liv. ii. ch. 7.) We may also select the name of Herodicus as having been considered the inventor of what was styled gymnastic medicine, (*Clerc*, part. i. liv. ii. ch. 8. *Mercurialis*, De Arte Gymnastica. *Schulz*, p. 192 et seq. *Barbier*, in Dict. Scien. Méd., art. "Gymnastique." *Ackermann*, per. 2, cap. 6,) which was regarded by the Greeks as a very important branch of the art. Schools for the practice of the gymnastic exercises were established in various parts of Greece, and were placed under the direction and superintendence of persons especially trained for the purpose, who took charge of the health of their pupils, and who appear to have undertaken the treatment both of the accidents which occasionally occurred in their establishments, and also, when necessary, of internal diseases. These gymnasiarchs, as they were styled, must in this way have acquired a certain degree of information respecting the nature of disease, and seem to have been considered as among the most skilful practitioners of the age in which they lived.*

CHAPTER II.—*An account of the opinions and practice of Hippocrates and his contemporaries—Remarks on the history and education of Hippocrates—High estimation in which he was held—Remarks on his character and acquirements—On his works—Account of his principles and doctrines, his physiology, pathology, anatomy, and practice.*

We now enter upon the history of an individual of very distinguished character and acquirements, who was destined to effect a complete revolution in his profession, and to introduce a system which may be considered as having laid a foundation for all its future improvements. The contemporaries and immediate successors of Hippocrates were so sensible of his merit that he acquired from them the title, which he has since retained, of Father of Medicine; and it may be confidently affirmed that the science is more indebted to his genius and ability than to that of any single individual. It is a little remarkable that, notwithstanding the great celebrity which he attained, we have no very correct knowledge of his history, of the mode of his education, or of the means by which he acquired his wonderful pre-eminence. All that we are able to learn on these points with any degree of certainty is, that he was brought up among the Asclepiades, who were attached to the temple of Cos, that he studied medicine under Herodicus, and that he embraced the philosophical hypothesis of Heraclitus; he is also reputed to have been a lineal descendant, in the eighteenth degree, from Æsculapius, and may therefore be supposed to have been devoted to the profession from an early period of life, and must have had access to all the records which were accumulated in the establishment to which he belonged. These circumstances may have had the effect of originally directing his mind to the pursuits in which he afterwards became so eminent; but we must suppose that he possessed from nature a genius singularly adapted to the advancement of medical science, by which he was enabled so far to surpass all those who were placed in situations equally advantageous. We are informed that he spent a considerable portion of his life in travelling through foreign countries, partly for the purpose of obtaining information, and partly from the circumstances of his assistance being required to undertake the cure of persons of rank, to arrest the progress of epidemics, or to check the ravages of endemic diseases. The works that he left behind him are very numerous, and considering their antiquity they may be regarded as in a tolerably perfect state.

Unfortunately, however, to those which appear to have a just claim to be considered as his genuine productions, there are appended a number of

* *Plato*, De Repub. passim. et De Leg. lib. vii. Schulz has judiciously summed up in a series of general propositions the history and progress of medicine up to the period at which we are now arrived; p. 201, 2.

others, which it may be concluded are spurious, either written by his pupils or successors, or fraudently attached to his name in consequence of its great celebrity. Many eminent critics have exercised their ingenuity in endeavouring to separate the genuine from the spurious writings of Hippocrates; and in such estimation was he held, that for many ages a main object with all writers on medical topics was to comment on the works of Hippocrates, to elucidate his principles by subsequent observation, or to support their respective doctrines by his authority. He is mentioned with great respect by Plato, Celsus, and Pliny, and by others among the ancients; Galen speaks of him with a degree of almost enthusiastic admiration, and at the revival of letters the most learned men of the times devoted themselves to the elucidation of his works by glossaries, commentaries, and criticisms of all descriptions. In Italy, Germany, and France, where learning first began to revive, and where the earliest universities were established, we have, among other illustrious names, those of Alpinus, Cornarius, Hollerius, Ballonius, Mercurialis, Fernel, Heurnius, Sennert, Foësius, Riolan, and Duret,* who, however they might differ in their opinions and practice, all coincided in regarding Hippocrates with equal respect, and considered him as having first placed the study of medicine on its correct basis.†

We are hence naturally led to inquire what were the circumstances, in the intellectual or literary character of Hippocrates, which produced this powerful impression, and perhaps we may assign the following as among the most influential. He appears to have had the sagacity to discover the great and fundamental truth, that in medicine, probably even more than in any other science, the basis of all our knowledge is the accurate observation of actual phenomena, and that the correct generalization of these phenomena should be the sole foundation of all our reasoning. Every page of Hippocrates proves that he was not without his speculations and hypotheses, but at the same time we perceive that, for the most part, they were kept in subjection to the result of observation, and that when they appeared to be in opposition to each other, he had the wisdom to prefer the latter. Hence his descriptions of particular diseases, after all the revolutions of customs and habits, both moral and physical, are still found to be correct representations of nature, while his indications of cure, and the treatment derived from them, are generally rational and practicable. When we reflect that at this period anatomy was scarcely practised,‡ that physiology was almost unknown, that the materia medica was nearly confined to vegetable substances, and of these to such as were indigenous to Greece and the neighbouring countries, our admiration of the skill and talents of Hippocrates will be still farther increased, and we are induced to regard him as one of those rare geniuses, who so far outstrip their contemporaries as to form an æra in the history of science.

With respect to the particular improvements which he introduced into the practice of medicine, we may remark that one of the first importance was the narration of individual cases of disease, a plan which may perhaps have been suggested to him by the votive tablets deposited in the temple of Æsculapius, but upon which he so far improved as to be entitled to the merit of an inventor. The second point on which we shall remark, was his method of endeavouring to remove particular symptoms by carefully noticing what have been termed the *juvantia* and the *lædentia*, watching the effect of his applications, and proceeding, by a cautious analogy, from individual facts to more general conclusions, and hence deducing his indications of cure from the operations of remedies, not from any preconceived or abstract principles, which were generally either fallacious or inapplicable. Hence his practice may be characterized as consisting in what has been termed a rational empiricism, where we first ascertain the fact, and afterwards reason upon its consequences.

In speaking of the writings of Hippocrates, it may be proper to remark that the most complete edition of them, in all respects, is that of Foësius, in which every circumstance is attended to that can illustrate them or render them more easily intelligible. He has given a list of all the commentaries and criticisms that had been written upon them, which at the time of his publication, in the year 1595, would of themselves have formed an extensive library. It appears from this list that no less than one hundred and thirty-seven authors had published on the subject of the Aphorisms alone. It was remarked above that many of the writings which are commonly ascribed to Hippocrates, or at least are published in the collection of his works, are supposed not to have been his genuine productions, and hence it has been an object of interest with many eminent critics to distinguish the one from the other. It will not be necessary for us to enter into these discussions in this place; we shall only remark that the number of treatises which are admitted to be certainly genuine is very small compared to the whole number popularly ascribed to him. Of those which are printed in the ordinary editions of his works, which amount to more than sixty, Mercurialis, Haller, Gruner, and other critics conceive that there are a few only which were actually written by Hippocrates, while Ackermann has reduced the number of the genuine works to ten.*

In ascertaining what were the real opinions and practices of Hippocrates, besides the difficulty of discriminating the genuine from the spurious productions, we have a farther difficulty arising from the peculiarity of his style. This is admitted to

* In designating the names of authors who flourished after the revival of letters, it is somewhat difficult to determine, whether we ought to employ their actual or their latinized names; we have adopted the former, where it could be done without ambiguity or the appearance of affectation.

† *Conring*, Intr. cap. 3. § 8 et alibi. *Haller*, Bibl. Med. Prac lib. vi.; it is entitled "Schola Hippocratica," and is carried down to the beginning of the seventeenth century.

‡ *Gruner*, Analecta. diss. 2. "Hippocrates, corpora humana insecuerit necne?" He discusses the question with much learning and candour, and decides in the negative.

* *Conring*, cap. 3, § 8. *Clerc*, par. 1, liv. iii. ch. 30. *Mercurialis*, Censura et Dispositio Operum Hippocratis. *Gruner*, Analecta, No. 2. *Kühn*, Bib. Med. p. 167–171, for the editions of Hippocrates. *Haller*, Bibliotheca Med. Prac. lib. 1. § 17–21. *Eloy*, Dict. hist. in loco. *Ackermann*, Inst. Hist. Med. per. 1. cap. 8, § 102. *Blumenbach*, Introd. § 34. *Goulin*, Enc. Meth. Médecine, "Hippocrate," p. 202–5.

be brief and abrupt, and to be full of ideas compared with the number of words employed to convey them, so that it appeared somewhat obscure even to his contemporaries and immediate successors. Erotianus, who lived in the first century of the Christian era, thought it necessary to write a glossary for the express purpose of elucidating his phrascology; and the immense number of commentaries which have appeared, and which continued to be published until the commencement of the eighteenth century, must be regarded, not only as a tribute to his extraordinary merit, but in some measure as an indirect censure of his style. But after making all due allowance for these peculiarities, after rejecting all the doubtful works and obscure passages, and resting more upon the general scope and tendency of the treatises than on particular words and phrases, we have sufficient evidence left us of the nature of his principles, both as regards theory and practice. Although it is principally in the latter capacity that we are now to regard Hippocrates, yet it will be proper to make a few remarks upon his acquirements in the analogous departments of science.

With respect to his philosophical tenets it appears that the father of medicine must be classed generally among the Pythagoreans, and in the particular sect or school of Heraclitus. The leading doctrine of this philosopher was, that fire is the prime origin of all matter, and that by the collision and peculiar combination of its particles, which are in perpetual motion, the four elements are produced. (*Enfield*, b. 2, c. 14, v. 1. p. 436 et seq.) From this doctrine Hippocrates derived his leading principles of pathology; it lies at the foundation of all his medical hypotheses, and is brought forward in various parts of his works. But although, like all his contemporaries, and indeed nearly all his successors up to the present day, he assumed certain theoretical principles, yet, as we remarked above, he had the extraordinary sagacity to perceive the necessity of detaching medicine from what was then styled philosophy. He professed to examine the phenomena of disease in the first instance, to ascertain what were the natural powers and properties of the animal frame, how far these were affected by external circumstances and by morbid causes, and hence to derive his curative indications and his mode of treatment. It is in the writings of Hippocrates that we observe the first traces of what is properly styled physiology, i. e. an account of the functions and powers of the living body. Although some of his opinions were derived from the school of Pythagoras, and savour of its mysticism and obscurity, yet others appear to have been original, and founded upon a much more correct and philosophical view of the subject. We owe to him the invention of the hypothesis of a principle, to which he gives the appellation of nature (φυσις), which influences all parts of the corporeal frame, superintends and directs its motions, and which is possessed of a kind of intelligence, so as to promote all the actions which are beneficial, and repress those which have an injurious tendency. In addition to this general principle, he conceives of others of a subordinate nature, which he styles powers (δυναμεις), which are more particularly concerned in the action of the various functions of the body. The body itself is supposed to consist of the four elements, combined in different proportions in different individuals, so as to produce an original difference in the constitution of the body, giving rise to the four temperaments. These influence both the intellectual and the corporeal part of our frame, and lay a foundation for disease independent of external circumstances, and cause these circumstances to operate in different modes and in different degrees in different individuals.

One of the leading pathological doctrines of Hippocrates was, that the fluids are the primary seat of disease, a doctrine which, under the denomination of the Humoral Pathology, became the prevailing opinion of all sects and of all theorists, until the commencement of the eighteenth century. The combination of the four elements with the four states or qualities with which they were affected, of hot, cold, moist, and dry, gave rise to the four fluids or humours of the body; blood, phlegm, bile, and black bile, which originally tended to produce the four temperaments, and which in their turn contributed to the excess or defect of each of the humours.

Another of the most important doctrines of Hippocrates is that of crises, or the natural tendency of disease to a cure at certain stated periods, depending upon a natural train of actions, which, when proceeding in their due course, terminate in the removal of the morbid action. These supposed crises were, for the most part, evacuations of various kinds, especially by the bowels or the skin, and hence the regulation of these evacuations led to his most important indications, and became a main part of his practice. There is no subject on which Hippocrates showed more sagacity and accurate observation than in watching the effect of external agents upon the system, such as temperature, the influence of the atmosphere, the effect of particular situations, of the seasons, and other analogous circumstances. In most of these cases the causes were obscure, and he frequently erred in his attempts to explain them; but his observations were correct, and contributed materially to the success of his practice.

The extent of knowledge which Hippocrates possessed on the subject of anatomy has given rise to much learned discussion. While his admirers were unwilling to admit that he was deficient in any of the departments of medical science, and attempted to prove that he had acquired a correct knowledge of the structure of the body, it has been contended, on the other hand, that on this point his information was very imperfect. This may be readily supposed to be the case from the abhorrence with which the dissection of the human subject was regarded at that period, and from the little attention which was paid even to comparative anatomy. There are likewise other considerations of an especial nature, which lead us to conclude that he had little knowledge of the internal structure of the body, or of the relation of its different parts to each other. Notwithstanding, therefore, the claim which has been set up for Hippocrates, by some of his devoted advocates, to a knowledge of the circulation of the blood, and other claims equally extravagant and unfounded, we may conclude, with the learned and candid Le

Clerc, that the knowledge which Hippocrates possessed of anatomy was little if at all superior to that of his contemporaries. (*Clerc*, part 1, liv. liv. iii. ch. 3. *Shulz*, per. 1, sec. 3, cap. 2, § 1-8. *Sprengel*, t. 1. p. 302 et seq. *Gruner*, Analecta, No. 2. *Lauth*, liv. iii. passim.)

After these brief observations on the theoretical doctrines of Hippocrates, and of the knowledge which he possessed in the various departments of medical science, we must conclude this chapter with a somewhat more minute account of his practice. Although he has published no regular treatise on practical medicine, nor laid down any specific rules on this subject, he has given us in several parts of his works a minute detail of his treatment of various diseases, so that we are enabled to ascertain, with considerable minuteness, the general principles on which he acted, as well as the mode in which he applied them. The great principle which directed all his indications was the supposed operation of "nature," to which we have referred above, in superintending and regulating all the actions of the system. The chief business of the physician is to watch these operations, to promote or suppress them according to circumstances, and perhaps in some rare cases to attempt to counteract them. The tendency of this mode of practice would be to produce extreme caution, or rather inertness, on the part of the practitioner, and we accordingly find that Hippocrates seldom attempted to cut short any morbid action, or to remove it by any decisive or vigorous treatment. Considering the state of knowledge on all subjects when he lived, it must be admitted that this plan of proceeding was much more salutary than the opposite extreme, and that it had likewise the good effect of enabling the practitioner to make himself better acquainted with the phenomena of disease, and by observing the unaided efforts of nature, to form his indications with more correctness, and to determine to what object he ought more particularly to direct his attention. It has been remarked that a man who is possessed of an acute and penetrating genius, however strongly he may be attached to a favourite hypothesis, contrives to adapt it to the information which he acquires, and this was in some measure the case with Hippocrates. For, notwithstanding the grand principle of the all-sufficient and unerring superintendence of nature, we have another general principle brought into view, which appears altogether of an opposite tendency, viz. that a disease is to be cured by inducing a contrary state of the system, or a contrary action in the morbid part. Thus, repletion is to be relieved by evacuation, and the effect of excessive evacuation to be removed by inducing repletion; the excess or defect of any of the humours or qualities is to be relieved by the employment of such means as may augment or diminish the contrary humour or quality. Perhaps it may be said that in these cases the practitioner is in fact only anticipating the operation of nature, or producing that change which would naturally ensue were there not some unusual counteracting cause which prevented or repressed it. But it is of comparatively little consequence in what way he reconciled this apparent discordance, we have every reason to feel assured that this mode of treatment is frequently correct, and Hippocrates evinces the superiority of his genius by not suffering his judgment to be warped even by the influence of a favourite hypothesis.

A third principle which very materially affected the practice of Hippocrates was the doctrine of critical evacuations, to which we have alluded before. As diseases were supposed to originate in the prevalence of some morbid humour, so when they are suffered to run their course without interruption they are relieved by the discharge of the humour, and consequently the promotion of this discharge becomes an important indication which it is often easy to accomplish, and which proves very effectual. Hence an important part of his practice consisted in the employment of evacuations of various kinds, and especially of purgatives, of which he used a great variety and administered them with great freedom. This, indeed, was the only part of his practice which can be considered as decidedly active, but even here we do not perceive that he transgressed the limits of prudence, while in the selection of the remedy and its adaptation to each particular case, he manifested considerable judgment and sagacity. With the same intention he prescribed diuretics and sudorifics; he drew blood both by the lancet and the scarificator; he applied the cupping-glasses; he administered injections and inserted issues. He made very frequent use of external applications, such as ointments, plaisters, liniments, &c., and was familiarly acquainted with the effects of external temperature. His materia medica was tolerably copious, and embraced many articles which still retain their place in our pharmacopœias. They were almost exclusively of vegetable origin, for the preparations which depend on chemical processes, such as metallic salts and oxides, the strong acids, with the spirituous compounds, were then totally unknown.

One important part of medical practice to which Hippocrates paid particular attention was the regulation of the diet; in this he displayed much sagacity and discernment, as well as on all points connected with the management of his patients, with regard both to the cure and prevention of disease. He appears to have been the first who noticed what has been called the epidemic constitution of the seasons, that inexplicable condition of the atmosphere, or of those influences to which the body is exposed, which appears to render it more or less obnoxious to certain morbid causes, and even to generate these causes at certain periods, without our being able to refer their production to any more general principle.

The tendency of the practice of Hippocrates to allow the operations of the system to pursue their course without interruption, united with his natural sagacity, enabled him to acquire great skill in prognostics, so that there is no part of his writings which exhibits more distinctive marks of a superior understanding than those in which he treats on this topic. Upon a review of the character and writings of this celebrated individual, we conceive that we are warranted in the conclusion, that while there are few persons of any age or nation who attained to greater distinction among their contemporaries, or whose memory has been more cherished by posterity, there was perhaps no

one whose fame was more merited or established upon a firmer foundation.*

CHAP. III.—*History of Medicine from the time of Hippocrates until its introduction into Rome—Establishment of the Dogmatic sect—Plato—Aristotle—School of Alexandria—Erasistratus—Herophilus—Division of Medicine into different departments—Into the Dogmatic and Empiric sects—Their general principles.*

We have not much to add respecting the state of medicine during the period which immediately succeeded to the death of Hippocrates. The advance which he made in the science, and the improvement which he introduced into the practice, were so considerable, that no one appeared for some centuries who was able to proceed, at least in any considerable degree, beyond the point of perfection to which it had been brought by the great father of medicine. In conformity with the custom of the times, Hippocrates transmitted his profession to his sons Thessalus and Draco, and we are informed that it continued to descend in the direct hereditary line for several successive generations. Polybus, his son-in-law, is singled out as having fully maintained the credit of his illustrious relative, and it is even said that many of the writings usually ascribed to Hippocrates are in reality the production of Polybus. (*Clerc*, part i. liv. iv. ch. 1.)

The only other names which we meet with in the annals of medicine among the Asclepiades, that are in any considerable degree distinguished, are, Diocles of Carystus, and Praxagoras of Cos. The former of these obtained a high reputation for his learning and practical skill: he appears to have adopted for the most part the opinions and practice of Hippocrates. (*Clerc*, part i. liv. iv. ch. 5. *Schulz*, p. ii. cap. 1, § 10–22. *Sprengel*, t. i. p. 366–2.) Of the latter, although he is enumerated among the successful improvers of the art, we have only very imperfect and unsatisfactory accounts. We are, indeed, informed that he paid great attention to anatomy, that he particularly noticed the state of the pulse, and derived many of his indications from this source; but we have little except the general fact of the estimation in which his name was held by his contemporaries, which can enable us to form an estimate of his merit. (*Clerc*, part i. liv. iv. ch. 6. *Schulz*, p. ii. cap. 1, § 23–8. *Sprengel*, t. i. p. 372–4.) The name of Chrysippus may be noticed in this place as one who appears to have been a kind of irregular practitioner, as we should style him, who did not belong to the family of the Asclepiades, and was principally remarkable for the innovations which he introduced into practice.† But like too many of those whose fame is principally founded on the novelty of their opinions, we do not find much to commend in them. We are told that he did not allow, in any case, of bleeding, and that he discountenanced the employment of all active purgatives; and, in short, that he rejected many of the most powerful and effective agents in the treatment of disease. (*Clerc*, part ii. liv. i. ch. 1. *Schulz*, p. i. sect. 3, ch. 5, 6. *Sprengel*, t. i. p. 365.)

Draco and Thessalus, in conjunction with their relative Polybus, are generally regarded as the founders of what has been considered as the first medical sect or school which was established upon rational principles. It obtained the name of the Hippocratean, or more generally the Dogmatic school or sect, because it professed to set out with certain theoretical principles which were derived from the generalization of facts and observations, and to make these principles the basis of practice.

Although we can have no hesitation in pronouncing this to be the correct and legitimate method of pursuing the study of medicine, yet it must be acknowledged at the same time that it is a method which, if not carefully watched and strictly guarded by prudence and sagacity, is exposed to the greatest danger of being corrupted by ignorance and presumption. Hence we may easily conceive that it would be liable to fall into the grossest errors, and to lie open to the most serious imputations, and that a fair plea would always be found for exclaiming against the introduction of what is termed theory into the practice of medicine. This abuse of the principles of the Dogmatists gave rise to the rival sect of the Empirics, who, perceiving the false reasoning of the former, and the injudicious practice consequent upon it, professed to be guided altogether by experience, and to discard all theory. For many centuries these two sects divided the medical world, and even at this day, after all the revolutions of opinion and the improvements of science, we may observe very distinct traces of their influence. It was not, however, until a considerably later period that the Empirics formed themselves into a distinct sect and became the declared opposers of the Dogmatists. (*Sprengel*, sect. 4, ch. 1.)

Besides the individuals who belonged to the family of the Aselepiades, and who made medicine their particular profession or pursuit, most of the philosophers of Greece bestowed a certain degree of attention upon this science; for it appears that among the ancients, a knowledge of medicine was regarded as one of the branches of philosophy which was included in a course of general education. The only two, however, of the Grecian philosophers whom it will be necessary to mention on the present occasion, are Plato and Aristotle, who, although they did not compose any treatises on medicine strictly so called, make frequent allusions to it in various parts of their writings. The former of these authors, in his dialogue styled Timæus, and in his treatise de Republica, has entered into various physiological discussions respecting the functions of the body, and the supposed effect of their derangement in producing the morbid conditions of the system, and has offered various incidental observations on the practice of his contemporaries. But it does not appear that either the theory or the practice of medicine received any improvement from this philosopher. He made little or no addition to the

* *Clerc*, part i. liv. iii. *Conring*, cap. 2, § 11, et alibi. *Schulz*, per. 1, § 3, cap. 1–4. *Douglas*, Bibliogr. Anat. p. 1 et seq. *Barchusen*, diss. No. 12. *Haller*, Bib. Med. lib. i. § 17–21. *Sprengel*, § 3, chap. 3. *Enfield*, vol. I, p. 442–4. *Aikin's* Gen. Biog. in loco. *Goulin*, Enc. Meth. "Médecine," in loco. *Cabanis*, ch. 2, § 3. *Ackermann*, Inst. Hist. Med. p. 70–8. *Eloy*, Dict. in loco. Nouv. Dict. Hist. in loco. *Renauldin*, Biog. Univ. "Hippocrate."

† Pliny remarks of him, "Horum (referring to previous physicians) placita Chrysippus ingenti garrulitate mutavit." Nat. Hist. lib. xxix. cap. 1.

actual stock of our knowledge in any branch of natural science, while his peculiar genius rather led him to the formation of hypotheses and speculations derived from fanciful analogies, tinged with that air of mystery which pervades most of his writings. (*Clerc*, part i. liv. iv. ch. 3. *Stanley's* Hist. of Phil. part v. ch. 22, p. 79 et alibi. *Sprengel*, t. i. p. 337 et seq.)

Both the original turn of mind and the pursuits of Aristotle were much better adapted to improve the science of medicine than those of Plato. He made very great advances in the knowledge of nature; he was peculiarly well situated for the acquisition of new information on all subjects connected with natural history, and he diligently availed himself of his advantages. He was the first writer who published any regular treatises on comparative anatomy and physiology, and his works on these subjects may be still read with much interest, after all the additions which have been made to them by the labours of the moderns. (*Douglas*, Bibliogr. Anat. p. 9–11.) But, notwithstanding all these favourable circumstances, it may be questioned whether the influence of Aristotle has not been ultimately somewhat unfavourable to the progress of knowledge. With his valuable facts and observations he mixed up a large portion of recondite and refined speculation, so that it is frequently not easy to separate the one from the other; and so great was the ascendency which his genius acquired over the minds of men for many centuries after his death, that all his opinions, the most unfounded as well as the most philosophical, were indiscriminately received as established truths, which no one ventured to oppose or to controvert. (*Clerc*, part i. liv. ii. ch. 4. *Schulz*, p. ii. cap. 1, § 2 et seq. *Stanley*, part vi. passim. *Sprengel*, sect. 4, cap. 2.)

The next circumstance which we are called upon to notice in the history of medicine, is the establishment of the school of Alexandria. This was effected by the munificence of the Ptolemies, who, about three hundred years before the Christian era, laid the foundation of the celebrated Alexandrian library and of the school of philosophy, which is graced by so many illustrious names. The science of medicine was cultivated in this school with peculiar assiduity, and we owe some very essential improvements to its professors. Among the most famous of these are Erasistratus and Herophilus. We have not much accurate information respecting the personal history of these two individuals, nor have any of their works been transmitted to us; but we have a detailed account of their opinions and practice, given us by Galen, Cœlius Aurelianus, and others, so as to enable us to form a tolerably correct estimate of their merits. They are particularly mentioned as being the first who dissected the human subject, for which purpose the bodies of criminals were allotted to them by the government; and it appears that they amply profited by the advantage which was thus given them, so as very considerably to advance our knowledge of the structure of the body, especially by pointing out those circumstances in which the human subject differed from that of the animals who most nearly resembled it, and in correcting the errors on this point into which their predecessors had fallen. Nearly every part of the great system of which the body is composed, profited by their labours; they ascertained, with much more correctness than it had been previously done, the structure of the heart and the great vessels, and of the brain and nerves, and they even seem to have had some imperfect knowledge of the absorbents. We are informed that Erasistratus was the pupil of Chrysippus, and that he imbibed from him his prejudice against bleeding, and against the use of active remedies, trusting more to the operations of diet or the natural efforts of the system: hence we are to regard him as having improved the practice of medicine only indirectly, by the addition which he made to our knowledge of anatomy. (*Clerc*, part ii. liv. i. ch. 2–4. *Schulz*, p. ii. cap. 3, § 35–66. *Sprengel*, t. i. p. 439 et seq. *Lauth*, p. 140, 1.) The anatomical fame of Herophilus is so intimately blended with that of Erasistratus, that we are unable to assign to each his respective share of merit; but it would appear that the former was more correct and more skilful in the practical department. Of this we have one proof in the fact, which is stated by Galen, that Herophilus was one of the first who paid very minute attention to the varieties of the pulse; and his name is handed down to us by the ancients as entitled to the highest respect, both from his character and his acquirements.*

An important circumstance in the history of medicine, and more especially in that department to which our attention is particularly directed, occurred soon after the establishment of the Alexandrian school, viz. the division into distinct professions, which were exercised by different individuals. Previously to this period, the practice of what is more especially styled medicine and of surgery was exercised by the same person; the ἰατρος of the Greeks corresponding nearly to what we should now term the general practitioner. But about this time the separation into the departments of dietetics, pharmacy, and surgery commenced, and was gradually admitted into all succeeding schools or sects. The terms did not, however, possess precisely the same signification as in modern times. Dietetics comprehended not the regulation of the diet alone, but every circumstance connected with the general health or management of the patient, and corresponded very nearly to the "medicus," or physician of modern times. The second included not merely the department of the apothecary or the compounder of drugs, but the performance of many of the operations of surgery; while to the third was allotted the treatment of surgical diseases, many of the operations, however, being committed to the professors of the second branch. That this separation eventually tended to the improvement of the respective branches of the profession will scarcely be doubted, although it must at the same time be acknowledged that many of the distinctions which were introduced were frivolous and invidious, and are now rapidly yielding to the superior intelligence of modern times. (*Celsus*, lib. i. præf. *Schulz*, p. ii. cap. 5. *Clerc*,

* *Clerc*, part ii. liv. i. ch. 6. *Schulz*, p. ii. cap. 3, sec. 2–34. *Sprengel*, t. i. p. 43 et seq. *Lauth*, p. 139, 140.—For an account of the Alexandrian school generally, see *Sprengel*, sect. 4, ch. 3; and *Lauth*, liv. iv.

part i. liv. ii. ch. 9. *Eloy*, "Partage de la Médecine.")

It was about this period, i. e. shortly after the establishment of the Alexandrian school, that the great schism to which we have so often alluded took place. It was occasioned by the formation of the rival sects of the Dogmatists and the Empirics. Neither of these terms, in the first instance, bore exactly the same meaning which they convey to a modern ear. The controversy really consisted in the question, how far are we to suffer theory to influence our practice. While the Dogmatists, or, as they were sometimes styled, the Rationalists, asserted that before attempting to treat any disease, we ought to make ourselves fully acquainted with the nature and functions of the part which is affected, or rather of the body generally, with the operation of medical agents upon it, and with the changes which it undergoes when under the operation of any morbid cause; the Empiric, on the contrary, contended that this knowledge is impossible to be obtained, and, if possible, is not necessary;—that the minute and internal changes of the system and of its different parts are beyond the reach of our most acute observation, that it is alone essential to watch the phenomena of disease, and to discover what remedies are best fitted to relieve the morbid symptoms; that our sole guide must be experience; and that, if we step beyond this, either as derived from our own experience or observation, or that of others on whose testimony we can rely, we are always liable to fall into dangerous and often fatal errors. We may remark that this controversy, like so many others which have occupied the attention of mankind for a succession of ages, is partly verbal, and in so far as it is not verbal, that it is a question of degree. The boldest Dogmatist professes to build his theory upon facts, and the strictest Empiric cannot combine his facts without some aid from theory. The uniform experience of all the schools and sects from the days of Hippocrates to the present time, demonstrates that the undue extension of either of these systems is injurious, that they both originate from a partial view of the subject, and may generally be traced to some defect either in the acquired information or natural disposition of the practitioner. The controversy, however, forms so prominent a feature in the history of medicine, that it will be necessary to advert to it very frequently in the following pages; and we shall find that in estimating the value of the various opinions or modes of practice which will successively pass under our review, it will in most cases be necessary to inquire from which of these sects they emanated.*

Respecting the individuals to whom the origin of these sects should be referred, there is some degree of obscurity: the Dogmatists generally claim Hippocrates for their founder, and it is certain that he investigated with great care the functions of the animal body, the action of morbid causes upon it, and the operation of remedies, or, as we should style them, the general principles of pathology and therapeutics. But while, in this respect, he acted upon the principles of the Dogmatists, he was no less remarkable for the accuracy with which he observed the phenomena of disease, and the actual operation of remedies upon individual cases, or even upon particular symptoms; and it may be affirmed that, in most instances, when his preconceived hypotheses seemed to be in contradiction to the results of his experience, he wisely followed the latter. We may, however, easily imagine that his successors, not being possessed of his sagacity and industry, would prefer the easiest method of indiscriminately adopting all his principles and speculations, to the more arduous task of correcting or extending them by their own observation, and that they would in this way bring all theoretical reasoning into disrepute. It is more probable that this feeling would be gradually induced in the minds of practitioners, than that it would be at once announced by any single individual; and as a matter of historical fact, the ancients themselves were divided in their opinion as to the person to whom they should ascribe the origin of the Empirical sect. Pliny attributes it to Acron, a physician of Sicily, (Lib. xxix. cap. 1,) who was contemporary, if not prior to Hippocrates; while Celsus states that Serapion of Alexandria, who was said to be a pupil of Herophilus, was the first who distinctly professed the opinion that theory is to be totally discarded in medicine, and that direct experience should be our sole guide. (In præf. sub initio.) We have little correct information respecting either the history or the practice of Serapion; none of his writings have been transmitted to us, but from the scattered notices which we meet with concerning him, dispersed through the works of the ancients, it may be conjectured that he was a man of considerable acuteness and sagacity, and that he generally adopted the practice of Hippocrates and his school, although he discarded their theory. (*Schulz*, per. ii. cap. iv. § 8. et seq.)

All the medical men of the period at which we are now arrived, and for some centuries subsequent to it, were attached to one or other of these rival sects, and, it would appear, in nearly an equal proportion. Unfortunately, however, for the Empirics, it has happened that all their writings have perished, so that we are obliged to form our opinion of their merits principally from the representation of their antagonists. There is, indeed, one happy exception in the works of Celsus, who, in the commencement of his treatise, has given an account of the leading opinions of the two opposing sects in so candid and judicious a manner, as almost to supersede any more elaborate discussion. It has been thought by many that the view which Celsus gives of the controversy is too favourable to the Empirics; and we admit that we can scarcely read his account without being impressed with the opinion, that he advocates their side of the question. Yet the conclusion which he draws is perfectly candid, and is, indeed, not very remote from what the most enlightened practitioner would form at the present day;—that the perfect rule of practice is derived from a due combination of reason and experience; that without experience all preconceived theory would be vain and useless; and that by simple experience, without any attempt at generalization, we should frequently fall into gross errors, and be unable to profit even by

* For an elegant summary of the arguments employed in this controversy, the reader is referred to *Percival's* Essays, Nos. 1 and 2.

the very experience which is so much extolled. And, indeed, whatever may have been the professed plan of the supporters of the two sects, we shall always find that the practice of the most eminent of either party actually proceeded upon a judicious combination of the two systems; and we are now persuaded that it is upon such a combination that all further improvements of the science and practice of medicine must essentially depend.*

CHAPTER IV. — *On the state of Medicine among the Romans from its first introduction into Rome until the time of Galen—Roman superstitions—Archagathus—Cato—Asclepiades—Themison—Origin of the Methodic sect — Thessalus — Saranus — C. Aurelianus — Doctrines of the Methodics—Pneumatics and Eclectics—Aretæus—Archigenes—Celsus, his doctrines and practice—Condition of physicians in Rome—Pliny—Dioscorides.*†

For some centuries the school of Alexandria produced a succession of learned men, not only in medicine but in the other sciences, and contributed to the advancement of knowledge, or at least prevented the decay into which it was in danger of falling after the decline of the Grecian literature. It was during this period that the foundation was laid of the future grandeur of the Roman empire; but from the attention of this people being almost exclusively directed to warlike affairs, and perhaps also from other causes, science of all kinds, and medicine among the rest, was for a long time almost totally neglected. Rome had extended her empire far beyond the limits of Italy, and had subdued most of her rivals, before she condescended even to tolerate the pursuit of the arts and sciences. We are expressly told by Pliny, that for six hundred years she was without physicians. We cannot conceive it possible that during this long period no attempts were made to remove diseases; we can only understand by it that there were no individuals eminent for their knowledge or skill who were engaged in the profession, or perhaps that it was scarcely regarded as the object of distinct pursuit, or that individuals were not especially trained to the exercise of it. We have, indeed, abundant evidence of two circumstances; that in this, as in every other subject connected with the arts of life, the Romans servilely copied from the Greeks,‡ and that, as far as their medicine was concerned, wherever they deviated from them it was for the purpose of adopting various superstitious rites and ceremonies, indicating the most profound ignorance and the grossest superstition. Numerous instances of this kind are incidentally mentioned by Livy; and although he wrote in the refined age and splendid court of Augustus, they are introduced in the thread of his narrative as actual transactions, without any observation indicative of his disbelief of their efficacy.§ One of these is the account which he gives of the introduction of the worship of Æsculapius into Rome. In consequence of a fatal epidemic, the senate had recourse to the usual expedient of consulting the Sibylline books, where it was found to be enjoined upon them to transfer the worship of the god from Greece to their city. A formal deputation was accordingly despatched for the purpose, by whom the deity, unwilling to leave his native place, was seized by a stratagem, and was conveyed under the form of a serpent into Italy. He was received by the people of Rome with unbounded transport; a temple was erected to him on an island in the Tiber; the usual appendages of priests, with all their ceremonies, were appointed; and the plague was of course suspended.‖

Pliny further informs us that medicine was introduced into Rome at a later period than most of the other arts and sciences; that the practice of it had even been expressly prohibited by the citizens, and its professors banished. The account which he gives of so singular an occurrence is, that about two hundred years before Christ, Archagathus, a Peloponnesian, settled at Rome as a practitioner of medicine, and, as it may be inferred, was the first person who made it a distinct profession. He was received in the first instance with great respect, and was even maintained at the public expense; but his practice was observed to be so severe and unsuccessful, that he soon excited the dislike of the people at large, and produced a complete disgust to the profession generally, which led to the transaction mentioned above.¶ His practice seems to have been almost exclusively surgical, and to have consisted, in a great measure, in the use of the knife and of powerful caustic applications. We hear little more of the state of medicine in Rome for the next century; but from certain incidental observations we may infer that it remained principally in the hands of the priests, and consisted as before in superstitious rites and ceremonies. It appears, indeed, that the few individuals who devoted themselves to the cultivation of natural science, among other subjects directed their attention to medicine; and it is particularly stated that Cato introduced various articles into the materia medica, and wrote several treatises on medical topics. We are not able to form any just conception of their merit from the account which is given of them; but it is worthy of remark that he was a professed opponent to Grecian literature in general, and we may therefore conclude, would not avail himself of the improvements that had been made by the Greek physicians.**

* *Galen*, de Subfigurat. Empir. et alibi. *Celsus*, in Præf. *Barchusen*, Diss. nos. 10 & 13. *Clerc*, pars ii. liv. ii. *Shulz*, per. ii. cap. iv. *Sprengel*, sect. 4, ch. 1, 4. *Ackermann*, p. iii. cap 10–13.

† For a concise, and at the same time a comprehensive view of this period of the history of medicine, the reader is referred to the fifth section of Blumenbach's Introduction. We may further remark that this work may be consulted with advantage, in connection with almost all the names that pass in succession under our review.

‡ *Suetonius*, de Grammat. sub initio; the fact is admitted by Cicero and by Pliny, and is frequently alluded to in various parts of their writings.

§ The following references may be selected among many others of a similar kind:—Book i. ch. 31, Tullus consults the Sibylline books in order to stop the plague; —iv. 25, for the same purpose a temple was erected to Apollo;—v. 13, the books were again consulted;—vii. 2, a lectisternium was ordered for the same purpose, and afterwards the public games;—vii. 3, the plague was stopped by the dictator driving a nail.

‖ *Livius*, lib. x. cap. 47, et epitome ad lib. xi. *Val. Maximus*, lib. i. cap. 8, § 2. *Schulz*, p. ii. cap. 6, sect. 4, et seq. *Montfaucon*, Antiq. Suppl., v. i. b. v. ch. 1. *Lucianus*, Tooke's Trans. v. i. p. 635, note.

¶ Lib. xxix. cap. 1.

** *Clerc*, pars ii. liv. iii. ch. 1. *Schulz*, p. ii. cap. 6. *Ackermann*, p. iv. cap. 15.

We may presume that the prejudice which was excited against Archagathus would be gradually allayed, and that the improvement of the Romans in intellectual cultivation, although not considerable, would be at least sufficient to make them sensible of the necessity of attempting something beyond the mere power of charms and incantations for the removal of disease. Accordingly, about a century before the Christian æra, we find that another individual had acquired a very considerable degree of popularity at Rome which he maintained through life, and in a certain degree transmitted to his successors,—Asclepiades of Bythinia. It is said that he first came to Rome as a teacher of rhetoric, and that it was in consequence of his not being successful in this profession, that he turned his attention to the study of medicine. From what we learn of his history and of his practice, it would appear that he may be fairly characterized as a man of natural talents, acquainted with human nature, or rather with human weakness, and possessed of considerable shrewdness and address, but with little science or professional skill. He began upon the plan which is so generally found successful by those who are conscious of their own ignorance, by vilifying the principles and practice of his predecessors, and by asserting that he had discovered a more compendious and effective mode of treating diseases than had been before known to the world. As he was ignorant of anatomy and pathology, he decried the labours of those who sought to investigate the structure of the body, or to watch the phenomena of disease, and he is said to have directed his attacks more particularly against the writings of Hippocrates. It appears, however, that he had the discretion to refrain from the use of very active and powerful remedies, and to trust principally to the efficacy of diet, exercise, bathing, and other circumstances of this nature. A part of the great popularity which he enjoyed depended upon his prescribing the liberal use of wine to his patients, and upon his attending in all cases, with great assiduity, not only to every thing which contributed to their comfort, but that he flattered their prejudices and indulged their inclinations. By the due application of these means, and from the state of the people among whom he practised, we may, without much difficulty, account for the great eminence to which he arrived, and we cannot fail to recognise in Asclepiades the prototype of more than one popular physician of modern times.

Justice, however, obliges us to admit that he seems to have been possessed of a considerable share of acuteness and discernment, which on some occasions he employed with advantage. It is said that to him we are indebted, in the first instance, for the arrangement of diseases into the two great classes of acute and chronic, a division which has a real foundation in nature, and which still forms an important feature in the most improved modern nosology. In his philosophical principles Asclepiades is said to have been a follower of Epicurus, and to have adopted his doctrine of atoms and pores, on which he attempted to build a new theory of disease, by supposing that all morbid action might be reduced into obstruction of the pores and irregular distribution of the atoms. This theory he accommodated to his division of diseases, the acute being supposed to depend essentially upon a constriction of the pores, or an obstruction of them by a superfluity of atoms; the chronic, upon a relaxation of the pores, or a deficiency of the atoms.*

Asclepiades was succeeded in his professional reputation by his pupil Themison of Laodicea, who had the honour of founding a new sect in medicine, which for some time almost eclipsed the former rivals; this was the Methodic sect. The great object of Themison seems to have been to adopt a middle course between the Dogmatists and the Empirics, and to take advantage of the excellencies of each of them. He was, however, strongly impressed with the great principle of Asclepiades, the importance of reducing the science to a few general laws, which by their simplicity might be universally intelligible and of easy application. He therefore rejected all the abstruse and recondite speculations of the Dogmatists, and substituted in their place a few positions derived from the tenets of his master, and founded upon the Epicurean doctrines. He remarks that it is an essential part of the business of the practitioner to make himself acquainted with the nature of the human frame, with its laws while in the state of health, and with the changes which they experience from disease. All these he referred to the respective states of constriction and relaxation, and to the undue preponderance of one of them over the other. To these two, however, he added a third, or mixed state as he styled it, the nature of which is not very easy to understand; while by classing all medical agents under the two great divisions of astringents and relaxants, we learn how to apply the appropriate remedy for every disease.

Themison's doctrine must be regarded as a refinement, and certainly an improvement of that of Asclepiades; for although we have the states of constriction and relaxation professedly copied from his master, it is disencumbered of the more objectionable speculation of the atoms and pores. The theory of the Methodics contemplates the solids as the seat and cause of disease, in which respect it is directly opposed to that of Hippocrates, who traced the primary cause of disease to an affection of the fluids, giving rise to what has been termed the Humoral Pathology. The humoral pathology was zealously defended by Galen, and was universally adopted by his successors until the seventeenth century, when the opposite doctrine of solidism was revived, and has been gaining ground until the present day. It has been justly objected to Themison's theory, that even if we admit the correctness of his views respecting the states of constriction and relaxation of the system, there is a palpable absurdity in supposing that they can be coexistent in what he terms his middle state, as they are directly opposed to each other.

There is no work of Themison's extant, but we have an ample account of his practice in the writings of Cælius Aurelianus, who was a zealous

* *Plinius*, passim. *Celsus*, ubi supra et alibi. *Clerc*, pars ii. liv. iii. ch. 4–9. *Sprengel*, sect. 5, ch. 1. *Cabanis*, ch. 2, sect. 5. *Goulin*, Encyc. Méth., "Medecine Asclepiade." *Chaussier et Adelon*, in Biog. Univ., "Asclepiade."

defender of the tenets of the Methodic sect. They appear to have been diligent in the observation of the phenomena of disease, and sagacious in their employment of remedies; they seem, indeed, to have sustained their character of keeping a middle course between the Dogmatists and Empirics, avoiding the extremes of either, and combining the more useful parts of each system in a greater degree than had been done by their predecessors. (*Celsus*, in præf. *Clerc*, p. ii. liv. iv. sect. 1, ch. 1. *Barchusen*, Diss. 11. *Sprengel*, t. ii. p. 20–3. *Ackermann*, per. iv. ch. 17.)

For some time after the death of Themison, the opinions of the Methodics were generally adopted in Rome, and almost superseded those of the professed Dogmatists and Empirics, so that we shall have little to detain us in our progress, except to notice certain individuals who became remarkable from their personal history or character, or from some peculiarity in their opinions or practice. The first of this description in point of time is Thessalus, who lived about half a century after Themison, and who ranks as one of his followers. He was, however, an individual very different, both in character and in acquirements, from his master. He is stated to have been of mean birth and of defective education, but by cunning and artifice to have acquired great wealth and a high reputation. He began his career, in the usual mode of ignorance and self-sufficiency, by endeavouring to throw contempt on all his predecessors and contemporaries, by pretending to expose their errors, and by claiming to himself the discovery of a new theory of medicine, which should lead to more correct practice, and should supersede all farther attempts of the kind; in fine, he assumed to himself the pompous title of the conqueror of physicians (ιατρονικες).*

We shall not have occasion to dwell long upon one who is so unworthy of a place in the records of science; it is only necessary to remark concerning him, that he appears to have united the speculations of Asclepiades with those of Themison, and to have admitted the atoms and pores of the one, with the constriction and relaxation of the other. The only addition which Thessalus made to medical theory which deserves notice, is the introduction of what he terms metasyncrasis, or the method of producing an entire change in the state of the body. This he opposed to the practice of Hippocrates, who professed to watch over and regulate the actions of the system, as well to that of the Empirics, whose aim was to correct specific morbid actions, or to remove particular morbid symptoms. The term, as conveying a conceivable, if not an actual occurrence, was not without its value, and was generally adopted by medical writers; and even in the present day the principle implied in it serves as the foundation for some of our most important indications. (*Clerc*, p. ii. liv. iv. sect. 1, ch. 2, 3. *Sprengel*, t. ii. p. 28–31.)

The name of Soranus next occurs among the celebrated Roman practitioners. There is, indeed, some reason for supposing that there were no less than three physicians of this name, but the one who is most eminent appears to have been a native of Ephesus, to have studied at Alexandria, and finally to have settled in Rome. He was a strict Methodic, and is said to have been highly respected for his character and talents. His writings have not been transmitted to us, but probably the most valuable information which they contain is handed down to us by C. Aurelianus, whose work, if not, as some have supposed, a translation of Soranus's treatise, proceeds upon the same principles, and inculcates the same practice. (*Clerc*, p. ii. liv. iv. sect. 1, ch. 4. *Sprengel*, t. ii. p. 33–35.)

There is considerable uncertainty respecting both the age and the country of C. Aurelianus. Some writers place him as early as the first century of the Christian æra, while others endeavour to prove that he was at least a century later. This opinion is principally founded upon the circumstance of his not mentioning or being mentioned by Galen, indicating that they were contemporaries or rivals. Numidia has been generally assigned as his native country, but perhaps without any direct evidence; it may, however, be concluded from the imperfection of his style and the incorrectness of some of the terms which he employs, that he was not a native either of Greece or of Italy. But whatever doubts may attach to his personal history, and whatever defects exist in his writings, they afford us much valuable information respecting the state of medical science. He was a professed and zealous Methodic, and it is principally from his work that we are able to obtain a correct view of the principles and practice of this sect. In his descriptions of the phenomena of disease, he displays considerable accuracy of observation and diagnostic sagacity; and he describes some diseases which are not to be met with in any other ancient author. He gives us a very ample and minute detail of the practice which was adopted both by himself and his contemporaries; and it must be acknowledged that on these points his remarks display a competent knowledge of his subject, united to a clear and comprehensive judgment.

He divides diseases into the two great classes of acute and chronic, nearly corresponding to diseases of constriction and of relaxation, and upon these supposed states he founds his primary indications; but with respect to the intimate nature of these states of the system, as well as of all hidden or recondite causes generally, he thinks it unnecessary to inquire, provided we can recognise their existence, and can discover the means of removing them. Hence his writings are less theoretical and more decidedly practical than those of any other author of antiquity; and they consequently contributed more to the advancement of the knowledge and actual treatment of disease than any that had preceded them. They contributed in an especial manner to perfect the knowledge of therapeutics, by ascertaining with precision the proper indications of cure with the means best adapted for fulfilling them. The great defect of C. Aurelianus, a defect which was inherent in the sect to which he belonged, was that of placing too much dependence upon the two-fold division

* *Plinius*, lib. xxvii. cap. 1.—We have an amusing, and probably a correct account, given us by Lucian, of the successful knavery practised by an impostor of his age, named Alexander; see Tooke's Trans., vi. p. 630 et seq. He appears to have been a worthy successor of Thessalus, so far as respects his arrogance and presumption.

of diseases, and not sufficiently attending to the minute shades by which they gradually run into each other; a defect the more remarkable in one who shows so much attention to the phenomena of disease, and who for the most part allows himself to be so little warped by preconceived hypothesis. This view of the subject leads him not unfrequently to reject active and decisive remedies, when he could not reconcile their operation to his supposed indications; so that, although his practice is seldom what can be styled bad, it is occasionally defective.

There were two points in which C. Aurelianus, and the Methodics generally, decidedly opposed the doctrines and practice of the followers of Hippocrates, in trusting the removal of disease to the restorative powers of nature, and in attributing diseases to the excess or defect of particular humours. With respect to the former point, they conceived that it was as frequently necessary to oppose as to promote the natural actions of the system; and with respect to the latter, they did not admit the existence of the supposed four humours; and, even if their existence could be proved, they did not conceive that they were in possession of the means of acting upon them individually or specifically.

In the treatment of acute diseases, or those of constriction, the cure was effected by topical bleeding, (for general bleeding was rarely admitted,) and by narcotic and oleaginous applications, aided by a pure and sometimes by a moist air. Abstinence was strictly enjoined, and indeed often carried to an undue length; and in the administration of all remedies the practitioner was frequently guided by critical periods, generally of three, or in other cases of seven days. When the ordinary means of cure were found not to be successful, or when any circumstance occurred which appeared to contradict their application, C. Aurelianus had recourse to a preparatory system. This consisted principally in certain regulations regarding diet and exercise, in the use of the bath, frictions, and other external applications; when the system was thus prepared, the ordinary plan of treatment was had recourse to. Inflammatory diseases were supposed to depend upon constriction; abstinence, rest, and friction were enjoined in the first instance; bleeding general and local, baths, and certain vegetable preparations were then administered, while purgatives seem to have been seldom if ever employed. Little regard appears to have been paid to particular symptoms, and upon the whole we should be disposed to consider the practice as deficient in promptness and vigour, and not very unlike that which prevails at this day in many parts of the continent. We have mentioned above that C. Aurelianus seldom employed purgatives,—an unfortunate prejudice, by which he deprived himself of one of the most useful agents in the cure of disease; he also generally condemns the use of what are termed specifics, an error, if it be one, much more venial: he very sparingly employs diuretics, condemns narcotics, and rejects caustics and all similar applications.*

Although the Methodic sect continued to prevail among the Roman physicians during the greatest part of the two first centuries of the Christian æra, some alteration in the original tenets of Themison were gradually introduced, and it at length became subdivided into several minor sects or schools, which, although agreeing in certain fundamental principles, had each their peculiar views, which led to their separation from the main body, and to the adoption of specific appellations. Two of these were of sufficient notoriety to require being individually mentioned in this sketch, —the Pneumatics, and the Eclectics or Episynthetics.

The Pneumatics rose into notice about half a century after the death of Themison. They derive their appellation from the circumstance of their having introduced into their pathology the agency of what is termed the spirits (πνευμα), which, together with the solids and the fluids, compose the corporeal frame. It would be somewhat difficult to state, in a few words, to what supposed substance or power the term was applied; we may observe in it some traces of the pneumatic physiology of the modern chemists, while in some of its agencies it resembles the nervous influence. This sect has acquired considerable celebrity from the name of an eminent medical writer, which has been generally attached to it, that of Aretæus.

There is some uncertainty respecting both the age and the country of Aretæus; but it seems probable that he practised in the reign of Vespasian, and he is generally styled the Cappadocian. He wrote a general treatise on diseases, which is still extant, and is certainly one of the most valuable reliques of antiquity, displaying great accuracy in the detail of symptoms, and in seizing the diagnostic character of diseases. In his practice he follows for the most part the method of Hippocrates, but he paid less attention to what have been styled the natural actions of the system; and, contrary to the practice of the Father of medicine, he did not hesitate to attempt to counteract them when they appeared to him to be injurious. The account which he gives of his treatment of various diseases indicates a simple and sagacious system, and one of more energy than that of the professed Methodics. Thus he freely administered active purgatives; he did not object to narcotics; he was much less averse to bleeding; and upon the whole his materia medica was both ample and efficient. It may be asserted generally, that there are few of the ancient physicians, since the time of Hippocrates, who appear to have been less biassed by attachment to any peculiar set of opinions, and whose account of the phenomena and treatment of disease has better stood the test of subsequent experience. We have placed Aretæus among the Pneumatics, because he maintained the doctrines which are peculiar to this sect, and because he is generally considered as such by most systematic writers, although perhaps, strictly speaking, he is better entitled to be placed with the Eclectics.†

Of the sect of the Eclectics we know little except through the medium of the writings of their opponents. The most celebrated of them was

* Vide Opus. de Morb. Acut. et Chron. *Clerc*, p. ii. liv. iv. sect. 1, ch. 5-11; we have in this author a very ample account of the principles and practice of the Methodics. *Barchusen*, Diss. 11, § 5. *Haller*, Bib. Med. § 72. *Sprengel*, t. ii. p. 37 et. seq. *Eloy*, in loco. Biog. Univ. in loco.

† *Clerc*, p. ii. liv. iv. sect. 1, ch. 2, 3. *Barchusen*, Diss. 15, p. 232 et seq. *Haller*, Bib. Med. § 64. *Eloy*, in loco. *Goulin*, Encyc. Method. Medecine, t. iii. p. 385 et seq. *Sprengel*, t. ii. p. 82-7. *Chaussier et Adelon*, Biog. Univ. "Aretee."

Archigenes of Apamea, who practised at Rome in the time of Trajan, and enjoyed a very high reputation for his professional skill. He is, however, reprobated as having been fond of introducing new and obscure terms into the science, and having attempted to give to medical writings a dialectic form, which produced rather the appearance than the reality of accuracy. Archigenes published a treatise on the pulse, on which Galen has written a commentary; it appears to have contained a number of minute and subtile distinctions, many of which we may venture to affirm have no real existence, and to have been for the most part the result rather of a preconceived hypothesis than of actual observation; and the same remark may be applied to an arrangement which he proposed of fevers. He, however, not only enjoyed a considerable degree of the public confidence during his life-time, but left behind him a number of disciples, who for many years maintained a respectable rank in their profession. (*Clerc*, p. ii. liv. iv. sect. 2, ch. 1. *Barchusen*, Diss. 15, p. 240 et seq. *Sprengel*, t. ii. p. 75–82.)

It may appear singular that we have so many instances of individuals who have risen to great eminence, both from their professional skill and general science, but of whose private history we possess so little information. This is very remarkably the case with Celsus. We know little either of his age, his origin, or even of his actual profession. There are some incidental expressions which lead to the conjecture that he lived under the reigns of Augustus and Tiberius, and particularly the mode in which he refers to Themison would indicate that they were either contemporaries, or that Themison preceded him by a short period only. With respect to the country of Celsus, we have nothing on which to ground our opinion, except the purity of his style, which at most would prove no more than that he had been educated and passed a considerable part of his life at Rome.

With regard to his profession, there is some reason to doubt whether he was a practitioner of medicine, or whether he only studied it as a branch of general science, after the manner of some of the ancient Greek philosophers. This doubt has arisen principally from the mode in which he is referred to by Columella (De Re Rust. lib. vi. cap. 5) and by Quintilian, (Lib. xii. cap. 11,) and by his not being enumerated by Pliny among the physicians of Rome in his sketch of the history of medicine. Yet, on the other hand, it appears to us that his work bears very strong evidence that he was an actual practitioner, that he was familiar with the phenomena of disease and the operation of remedies, and that he described and recommended what fell under his own observation, and was sanctioned by his own experience; so that we conceive it, upon the whole, most probable that he was a physician by profession, but who devoted part of his time and attention to the cultivation of literature and general science.

The treatise of Celsus "On Medicine" is divided into eight books. It commences by a judicious sketch of the history of medicine, terminating by the comparison of the two rival sects, the Dogmatists and the Empirics, which has been referred to above. The two next books are principally occupied by the consideration of diet, and the general principles of therapeutics and pathology: the remaining books are devoted to the consideration of particular diseases and their treatment, the third and fourth to internal diseases, the fifth and sixth to external diseases and to pharmaceutical preparations, and the two last to those diseases which more particularly belong to surgery. In the treatment of disease, he for the most part pursues the method of Asclepiades; he is not, however, servilely attached to him, and never hesitates to adopt any practice or opinion, however contrary to his, which he conceived to be sanctioned by direct experience. He adopted to a certain extent the Hippocratean method of observing and watching over the operations of nature, and rather regulating than opposing them; a method which, with respect to acute diseases, may frequently appear inert. But there are occasions on which he displays considerable decision and boldness, and particularly in the use of the lancet, which he employed with more freedom than any of his predecessors. His regulations for the employment of bloodletting and of purgatives are laid down with minuteness and precision; and although he was in some measure led astray by his hypothesis of the crudity and concoction of the humours, the rules which he prescribed were not very different from those which were generally adopted in the commencement of the present century. His description of the symptoms of fever, and of the different varieties which it assumes, either from the nature of the epidemie, or from the circumstances under which it takes place, are correct and judicious; his practice was founded upon the principle so often referred to, of watching the operations of nature, conceiving that fever consists essentially in an effort of the constitution to throw off some morbid cause, and that, if not unduly interfered with, the process would terminate in a state of health. We here see the germ of the doctrine of the *vis medicatrix naturæ*, which has had so much influence over the practice of the most enlightened physicians of modern times, and which, although erroneous, has perhaps led to a less hazardous practice than the hypotheses which have been substituted in its room.

But perhaps the most curious and interesting parts of the work of Celsus are those which treat of surgery and surgical operations. It is very remarkable that he is almost the first writer who professedly treats on these topics, and yet his descriptions of the diseases and of their treatment prove that the art had attained to a very considerable degree of perfection. Many of what are termed the capital operations seem to have been well understood and frequently practised, and we may safely assert that the state of surgery at the time when Celsus wrote, was comparatively much more advanced than that of medicine. The Pharmacy of Celsus forms another curious and interesting part of his work, and, like his surgery, marks a state of considerable improvement in this branch of the art. Many of his formulæ are well arranged and efficacious, and on the whole they may be said to be more correct and even more scientific than the multifarious compounds which were afterwards introduced into practice, and

which were not completely discarded until our own times.*

There is one circumstance respecting Celsus which requires to be noticed—that he is the first native Roman physician whose name has been transmitted to us. Before his time all those who arrived at any degree of eminence were either Greeks or Asiatics, and it would appear that the native practitioners were either slaves or persons from the lower ranks of life, who acted in the subordinate branches of the profession.† This circumstance may be attributed partly to the low state of science in Rome, even during the period when literature had advanced to considerable eminence, and still more to the idea of degradation or servility which seems to have been attached to the exercise of any art or profession for the sake of gain. All the trades and manufactures of Rome were therefore carried on by slaves, and medicine seems to have been placed in the same class. It must, however, be observed that many individuals who were brought to Rome as slaves, either by their natural talents or by some favourable conjuncture of circumstances, overcame the disadvantages of their situation, and made considerable acquirements in different departments of knowledge, and among others in that of medicine. One of the most celebrated of these is Antonius Musa, who was appointed physician to Augustus, and obtained great celebrity from his practical skill: we are told that he was a pupil of Themison, and it appears that he remained attached to the Methodic sect. (*Haller*, Bib. Med. t. i. p. 150, 1. *Eloy*, in loco. *Aikin's* Gen. Biog. in loco.)

Before we close this part of our history, it will be necessary to take some notice of a class of writers, whose names or works are transmitted to us, who particularly devoted themselves to the improvement of pharmacy. The first of these was Scribonius Largus, who flourished in the reign of Claudius. He appears to have been, like Musa, originally a slave, and it may be conjectured from his work "On the Composition of Medicines," which has been transmitted to us, that he was never able to supply the deficiency of his education. It is a mere collection of nostrums and formulæ, without arrangement or discrimination, and is solely valuable as indicating the state of the art at the time of its publication. (*Haller*, Bib. Bot. t. i. p. 76, 7, and Bib. Med. lib. i. § 51, t. i. p. 166, 7. *Eloy*, in loco. *Sprengel*, t. ii. p. 55.)

Andromachus, a native of Crete, who lived under the reign of Nero, is principally known to posterity as the inventor of certain compounded pharmaceutical preparations, one of which, the theriaca, obtained so much celebrity as to have been retained in our pharmacopœia until the close of the last century. It was composed of no less than sixty-one ingredients, which were combined together with much ceremony and no inconsiderable degree of labour and skill. Its essential ingredient, from which it derived its name, was the dried flesh of vipers, against the bites of which animals it was supposed to be an antidote. But its supposed medical virtues were equal to the number of articles of which it consisted, so that there was scarcely a disease for which the theriaca of Andromachus has not been proposed as a remedy. Andromachus is further remarkable as being the first individual on whom the title of Archiater, or principal physician, was bestowed by the emperors, a title which was continued for several centuries. (*Clerc*, par. 3, liv. ii. ch. 1. *Eloy*, in loco. *Haller*, Bib. Med. lib. i. § 56, t. i. p. 178, 9.)

We have next to notice an author of just celebrity, whose writings form one of the most valuable remains of antiquity—Pliny the naturalist. Although not attached to the medical profession, and even, as appears from many of his remarks, by no means favourably disposed to it, in various parts of his great work he affords us much important information, both direct and indirect, respecting the history of medicine in all its branches, and more especially in all that concerns materia medica and pharmacy.‡ We meet with a great number of curious facts and remarks upon these subjects, so that we are enabled from them to form a tolerably complete conception of the state of medical science in the age in which he wrote. We learn from his works that the ordinary practice was in a considerable degree what may be termed empirical, consisting in the application of certain remedies for certain diseases, without any inquiry into their mode of operation. The materia medica, which was extensive, consisted principally of vegetable products, and these combined together in various forms, but without any regard to what we should now regard as scientific principles, either chemical or pharmaceutical. We find that they possessed various active remedies, adapted for the greatest part of the most important indications, so far as they could be obtained from vegetable or animal substances, but that in the application of them they frequently proceeded upon incorrect principles.

Another writer who lived about the same time with Pliny, and who, although less distinguished for general science, holds a conspicuous rank among the medical authors of this period, is Dioscorides. The same obscurity hangs over every thing which regards the personal history of Dioscorides as over that of so many individuals to whom we have had occasion to refer. It was generally supposed that he was a native of Asia Minor, and that he was a physician by profession. It appears pretty evident that he lived in the second century of the Christian era, and as he is not mentioned by Pliny, it has been supposed that he was a little posterior to him. The exact age of Dioscorides has, however, been a question

*Clerc, par. 2, liv. iv. sect. 2, ch. 4, 5. *Barchusen*, diss. 15, p. 231, 2. *Morgagni*, Epistolæ in Celsum. *Haller*, Bib. Med. t. i. § 49. *Eloy* in loco. Nouv. Dict. Hist. in loco. *Sprengel*, t. ii. p. 25–8. *Black's* Hist. of Medicine, p. 63–82. *Goulin*, Encyc. Méth. "Médecine," in loco. *Petit-Radel*, Biog. Univ. "Celse."

† *Clerc*, par. 3, liv. i. ch. 2. The condition of the practitioners of medicine in Rome was the subject of a learned controversy between Mead and Middleton; see Life of Mead, prefixed to his works, v. i. p. 13, Edin. 1765, and Aikin's Gen. Biog. art. "Middleton."

‡ The late illustrious naturalist Cuvier has formed what we conceive to be a very just and candid estimate of the literary and philosophical character of Pliny, Bibl. Univ. t. xxxv. in loco; the same inserted into the translation of Pliny by M. Aj. de Grandsagne, t. i. p. lxxxv. See *Eloy*, in loco, for a list of the various editions, &c. of Pliny; he enumerates one hundred and ten, of which it is worthy of notice that only two were printed in England. *Haller*, Bib. Bot. t. i. p. 91–8.

of much critical discussion, and we have nothing but conjecture which can lead us to decide upon it. He has left behind him a treatise on the materia medica, a work of great labour and research, and which for many ages was received as a standard production. The greater correctness of modern science, and the new discoveries which have been made, cause it now to be regarded rather as a work of curiosity than of absolute utility; but in drawing up a history of the state and progress of medicine, it affords a most valuable document for our information. His treatment consists of a description of all the articles then used in medicine, with an account of their supposed virtues. The descriptions are brief, and not unfrequently so little characterized as not to enable us to ascertain with any degree of accuracy to what they refer, while to the practical part of his work the same remark nearly applies that was made above with respect to Pliny, that it is in a great measure empirical, although his general principles, so far as they can be detected, appear to be those of the Dogmatic sect. The great importance which was for so long a period attached to the works of Dioscorides, has rendered them the subject of almost innumerable commentaries and criticisms, and even some of the most learned of our modern naturalists have not thought it an unworthy task to attempt the illustration of his Materia Medica. Upon the whole we must attribute to him the merit of great industry and patient research, and it seems but just to ascribe a large portion of the errors and inaccuracies into which he has fallen, more to the imperfect state of science when he wrote, than to any defect in the character and talents of the writer.*

CHAPTER V.—*Account of the opinions and practice of Galen—History and Education of Galen—Remarks on his character and writings—His physiology, anatomy, pathology, and practice.*

The course of our narrative brings us to one of those extraordinary characters who are destined to form an æra in the history of science, both from the actual improvements which they have introduced into it, and from the ascendency which their genius enabled them to acquire over the minds of their contemporaries. Of these, one of the most remarkable that ever appeared either in ancient or in modern times, is Galen. Galen enjoyed both from birth and from education every natural and acquired advantage; his father was a man of rank, and his education appears to have been conducted upon the most liberal and judicious plan. He studied philosophy in the various schools that were then in the highest estimation, and without exclusively attaching himself to any one of them, he is said to have taken from each what he conceived to be the most important parts of their systems, with the exception of the Epicurean, the tenets of which he entirely rejected. His professional studies were conducted upon an equally extensive plan; he attended the various schools and travelled through different countries for the express purpose of acquiring information, but it may be presumed that his knowledge of medicine was principally acquired at Alexandria, which still retained its character as the great depository of medical science. After passing a few years at his native city of Pergamus, spending some time at Rome, and again at Pergamus, he finally returned to Rome in consequence of the express request of the Emperor Aurelius, and made that city his residence for the remainder of his life.

The works which Galen left behind him are very numerous, amounting in the whole to about two hundred distinct treatises; they are all on subjects directly or indirectly connected with medicine, and exhibit a great extent of knowledge on the subjects of which he treats, and a degree of information, as far as we can judge, greater than that of any of his contemporaries. He appears also to have been a man of a superior mind and of a very decided character; confident in his own powers, and paying but little attention to the opinions of others. Hence he may be accused of arrogance and of want of candour, and he can only be defended upon the principle that he was so far in advance of his contemporaries as to be fully convinced of the futility of their reasoning and the deficiency of their information. The result was that he gained that superiority over his contemporaries which he assumed, and actually acquired a sway over public opinion on all points connected with medicine which has never been obtained by any individual either before or since his time. The rank which Galen held in the medical world has been compared not unaptly to that which Aristotle possessed in the world of general science. For centuries after his death his doctrines and tenets were regarded almost in the light of oracles, which few persons had the courage to oppose; and all the improvements in medicine which were even contemplated, consisted of little more than illustrations of his doctrines or commentaries on his writings. In numberless instances it was deemed a sufficient argument, not merely against an hypothesis, but even against an alleged matter of fact, that it was contrary to the opinion of Galen; and it may be stated without exaggeration that the authority of Galen alone was estimated at a much higher rate than that of all the medical writers combined who flourished during a period of more than twelve centuries.

Although such a brilliant reputation might in some measure depend upon accidental circumstances and upon the mere personal character of the individual, we may fairly presume that there must have been a foundation of a more solid nature; and upon an actual survey of the writings of Galen, we shall find ample reason to conclude that he was a man of great talents and of very extensive acquirements. In his general principles he may be considered as belonging to the Dogmatic sect, for his method was to reduce all his knowledge, as acquired by the observation of facts, to general theoretical principles. These principles he indeed professed to deduce from experience and observation, and we have abundant proofs of his diligence in collecting experience, and his accuracy in making observations. But

* *Cicre*, par. 3, liv. ii. ch. 2. *Eloy*, in loco, where we have an account of the various editions, comments, translations, &c. *Sprengel*, t. ii. p. 58-64. *Ackermann*, p. 4, cap. 19. *Haller*, Bib. Bot. t. i. p. 79-87. *Goulin*, Encyc. Méth. Médecine, "Dioscoride." *Du-Petit-Thouars*, Biog. Univ. in loco.

still, in a certain sense at least, he regards individual facts and the detail of experience as of little value, unconnected with the principles which he laid down as the basis of all medical reasoning. In this fundamental point, therefore, the method pursued by Galen appears to have been directly the reverse of that which we now consider as the correct method of scientific investigation, and yet such is the force of natural genius, that in most instances he attained the ultimate object in view, although by an indirect path. He was an admirer of Hippocrates, and always speaks of him with the most profound respect, professing to act upon his principles, and to do little more than to expound his doctrines and support them by new facts and observations. Yet in reality we have few writers whose works, both as to substance and manner, are more different from each other than those of Hippocrates and Galen, the simplicity of the former being strongly contrasted with the abstruseness and refinement of the latter. Those of his works which are the most truly valuable, and in which he actually rendered the greatest service to science, are his treatises on physiology. The knowledge which he possessed on this subject was much more considerable than that of any of his contemporaries; in all that regards the operations of the animal economy he was much better acquainted with the facts, and much more ingenious in the application of them. He appears to have been well practised in anatomy, and especially in what may be termed pathological anatomy he far surpassed any of the ancients. His knowledge of particular structures was in many respects correct, and in his mode of classifying them he made no inconsiderable approach to the philosophical views which have been taken of them by the anatomists of the present day. It appears upon the whole probable that he was not in the habit of dissecting the human subject, and, indeed, this may be fairly inferred from his own remarks; but there is reason to suppose that he omitted no opportunity of examining the structure of those animals which the most nearly resemble it, and that from them he has drawn up his descriptions. Considering this radical defect, it must be admitted that they possess great merit, and we may justly express our surprise at the few points in which they betray the imperfections of their origin. (*Douglas*, Bibliog. p. 18–22.)

The pathology of Galen was much more imperfect than his physiology, for in this department he was left to follow the bent of his speculative genius almost without control. He adopts, as the foundation of his theory, the doctrine of the four elements, and, like Hippocrates, he supposes that the fluids are the primary seat of disease. But in his application of this doctrine he introduced so many minute subdivisions and so much refined speculation, that he may be regarded as the inventor of the theory of the Humoralists, which was so generally adopted in the schools of medicine, and which for so long a period entirely engrossed their attention. The four elements, the four humours, and the four qualities, connected in all the variety of combinations, presented a specious appearance of method and arrangement, which took such firm possession of the mind as to preclude all inquiry into the validity of the foundation, and to present us with one of the most remarkable examples of the complete prostration of the understanding in a physical science, where facts were daily obtruding themselves upon observation, but were either unnoticed or totally disregarded.

The practice of Galen in its general character appears to have been similar to his pathology, and, indeed, to have been strictly deduced from it. His indications were in exact conformity to his theory, and the operation of medicines was reduced to their power of correcting the morbid states of the fluids, as depending upon their four primary qualities or the various modifications of them. Many parts of his writings prove that he was a diligent observer of the phenomena of disease, and he possessed an acuteness of mind which well adapted him for seizing the most prominent features of a case, and tracing out the origin of the morbid affection. But his predilection for theory too frequently warped and biassed his judgment, so that he appears more anxious to reconcile his practice to his hypothesis than to his facts, and bestows much more labour on subtile and refined reasoning than on the investigation of morbid actions or the generalization of his actual experience.

The number of treatises which Galen left behind him is very considerable, amounting to nearly two hundred separate works, embracing every department of medical science. His style is generally elegant but diffuse, and as may be imagined from the multiplicity of his works, he frequently repeats and copies from himself. Considered under the two classes of anatomy and physiology, and of pathology and practice, the following may, perhaps, be selected as the most valuable, both with respect to the absolute addition which they made to the previous stock of knowledge, and as to the reasoning employed in them. Under the first head we may select the treatise "On the Use of the Parts of the Body," in seventeen books, in which he describes the structure of the different organs, and assigns to each of them their use. This is a work of great anatomical research and physiological ingenuity, which contains many facts that were probably the result of his own investigation, and exhibits a very favourable specimen of his reasoning powers, when not too much under the influence of preconceived hypothesis. The same kind of merit, although less in degree, may be assigned to the treatise "On the Motion of the Muscles," and also to that "On the Formation of the Fœtus," making due allowance for the greater difficulty and obscurity of the subject.

Among the works of the second class the treatise "On Temperaments" has been greatly and justly celebrated, as well as that "On the Seat of Disease," while that "On the Varieties of the Pulse" affords a happy illustration of his peculiar turn of mind, of his acuteness and originality, and at the same time, of his devoted attachment to hypothesis. The two works, "On the Differences and the Causes of Diseases," and "The Method of Cure," are more especially interesting, as containing the most detailed view of his peculiar doctrines of the humoral pathology, of the indications of cure which he laid down, and the

methods which he adopted for their accomplishment. These two latter works exhibit a very complete view of the practice of Galen and of that of his contemporaries, and enable us to form a correct opinion of the state of the science when he entered upon the study of it, and of the additions which he made to it. To attempt an analysis of the works themselves or of the details of Galen's practice, would carry us far beyond the limits of this treatise, and, indeed, it would be principally as a question of literary curiosity that such an examination could be sustained. Their general character may be understood from what has been stated above, and we fully coincide in the remark of a learned and impartial critic, the late Dr. Aikin, who, after giving full credit to Galen for talent and acquirements, thus concludes:—"His own mass and modern improvements have now in great measure consigned his writings to neglect, but his fame can only perish with the science itself." The remark which we formerly made with respect to Hippocrates applies equally to Galen, that the great superiority which he acquired over his contemporaries appeared to repress all attempts at farther improvement.*

CHAPTER VI.—*An account of the successors of Galen—Decline of medical science—Sextus Empiricus—Oribasius—Ætius—Alexander Trallianus—Paulus Eginetus—Account of the state of medicine among the Arabians—Conquests of the Arabians—Their patronage of science—Invention of chemistry—Ahrun—Serapion—Alkhendi—Rhazes—Ali-Abbas—Avicenna—Mesue—Albucasis—Avenzoar—Averroes—Estimate of the merits of the Arabic school.*

In investigating the state of medicine during the middle ages, it is apparent than mankind seemed to be satisfied with the progress which had been made in the science, or were conscious of their inability to surpass the limits which had been assigned to it; and the result was, that after the death of Galen we have few illustrious names to celebrate, and no discoveries to record. Literature in general was now, indeed, rapidly declining, and various causes both moral and political were coming into operation, which suspended the progress of science and learning for many centuries, and produced what are justly and emphatically denominated the dark ages. Into these causes it is not our business to inquire; it may be sufficient to remark that they were of so universal a nature as to operate on the human mind generally, and therefore to affect every intellectual pursuit. Medicine, among others, felt their paralysing influence, although, from certain incidental circumstances to be hereafter noticed, it was not allowed to remain so completely stationary as most of the other branches of science.

About the period when Galen flourished, the Roman empire began to exhibit very decided symptoms of that decline which, proceeding with more or less rapidity, was never altogether suspended until it terminated in complete destruction. Even in the most splendid state of Rome, the cultivation of science was very limited, and we have had occasion to remark that almost all the physicians who acquired any considerable degree of celebrity were natives of Greece or Asia, and wrote in the Greek language. This was the case with Galen himself and with the few individuals who succeeded him, whose names are of sufficient importance to be introduced into this sketch. The medical writers of the third and fourth centuries have been characterized by Sprengel as "de froids compilateurs, ou d'aveugles empiriques, ou de foibles imitateurs du médecin de Pergame." (T. ii. p. 170. Jourdan's Transl.)

The only exception to this remark is Sextus Empiricus, who appears to have been a contemporary of Galen, and probably derived his appellation from the sect to which he attached himself, as there are some treatises of his still extant in which he attacks the principles of the Dogmatists with considerable acuteness. We may conclude from his works that he was a man of learning and talents, well versed in the principles of the philosophers, and familiar with all the branches of literature and science which were cultivated in his time. (*Enfield*, v. ii. p. 136.) He is, however, the last medical writer to whom the character of Sprengel does not strictly apply. Oribasius, who lived in the fourth century, Ætius in the fifth, Alexander Trallianus in the sixth, and his contemporary Paulus, were all zealous Galenists, who professed to little more than to illustrate or comment on the works of their great master. Their writings are principally compilations from their predecessors; they are, however, occasionally curious from the incidental facts which they contain, and by furnishing us with extracts or abstracts of treatises which are no longer extant; but this constitutes almost their sole value. The only additions to the practice of medicine which they afford are an account of certain surgical operations, which is given us by Ætius, and a treatise by Paulus on midwifery, which is more complete than any that had previously appeared, and was long held in high estimation. But even these, which form but a small portion of the whole of their works, are connected with so much credulity and superstition, as to indicate at least the most degraded state of the science, if not the defective judgment of the writer. Ætius expressly recommended the use of medical arts and incantations, and that, not, as has sometimes been done in a more enlightened age, from a knowledge of the effect they might produce on the imagination of the patient, but apparently from his own opinion of their physical operation on the system. (*Conring*, cap. 3, sect. 18-20. *Sprengel*, sect. 6, ch. 1-3.) It must, however, be admitted that both in Alexander Tallianus and in Paulus we meet with various descriptions of disease, which indicate that they possessed the talent of accurate observation; and we may conclude that, although in what respects opinions they were the devoted followers of Galen, yet in the simple detail of facts their au-

* *Conring*, Introd. cap. 3, sect. 16; cap. 4, sect. 17, et alibi. *Clerc*, par. iii. liv. iii. ch. 1—8, contains a very ample account of all that regards the writings and opinions of Galen. At this period we lose the farther aid of this candid and judicious historian of medicine. *Earchusen*, Diss. No. 16, Nouv. Dict. Hist. "Galien.," *Haller*, Bib. Med. lib. i. sec. 80, 1. *Lauth*, liv. v. par. 1. *Sprengel*, sect. 5, ch. 6. *Ackermann*, cap. 21, 2. *Blumenbach*, Introd. sect. 75. *Goulin*, Encyc. Méth. Médecine, "Galien." *Renauldin*, Biog. Univ. "Galien."

thority may be relied upon with considerable confidence.*

With the death of Paulus, which took place about the middle of the seventh century, we may date the termination of the Greek school of medicine, for after his time we have no work written in this language which is possessed of any degree of merit. Those which occasionally appeared were mere servile transcripts of Galen and his disciples, or compilations formed without judgment or discernment, devoid of original observation, or even at any attempt at generalization or arrangement. To this degraded state was the science of medicine reduced in the former seats of learning, when a new school arose in a different quarter of the world, which will require our attention, from the actual additions which it made to our knowledge, as well as from the mode of its origin and the nature of its connection with the Grecian and Roman schools.

The city of Alexandria still retained its reputation as the great school of medicine, partly resting its fame on the excellence of its former professors, and in some measure depending on the value of its extensive library and other institutions favourable to the cultivation of science, the forms of which at least were still preserved. But even these feeble remains were destroyed by the conquest of the Arabians in the seventh century, who in the genuine spirit of blind bigotry appeared to be actuated by the barbarous desire of totally eradicating science from the face of the earth. The catastrophe which befel the Alexandrian library is too well known to be repeated in this place; a calamity, the full extent of which can scarcely be appreciated by one who is in the habit of regarding literature only as it exists in modern times, when books of all descriptions are multiplied to an excessive degree, and when the loss occasioned by the most splendid collection would be nearly confined to a single nation or community. It appears, however, that notwithstanding the brutal violence of the Saracen invaders, some books escaped from the general wreck of literature and science, and that there were not wanting some individuals who were capable of estimating their value. Among these relics were the writings of Galen, and we are informed that at an early period of the Saracenic empire they began to be held in very high estimation; they were translated into the Arabic language, were commented upon and elucidated in various ways, and soon acquired a degree of celebrity scarcely short of what they had previously enjoyed among the Greeks themselves. The Arabians were also in possession of the works of Hippocrates, but the simplicity of this author was less adapted to their taste than were the metaphysical refinements and elaborate arrangements of Galen, so that, while the latter was regarded with a respect amounting almost to veneration, the former was little read or estimated.

After the immediate successors of Mahomet had completed their conquest of a considerable part of the civilized world, they rested from their warlike triumphs, and seemed disposed to add to the splendour of their empire by the cultivation of the arts of peace. The patronage of literature was an express object of many of their rulers, and even the works of the Greek philosophers were translated and studied with much assiduity. But the spirit of Mahomedanism was decidedly averse to intellectual improvement, and we accordingly find that no additions were made to general science, and that very little was accomplished even in the collection of facts and observations. To this remark, however, medicine forms an exception; for although the Arabian physicians adopted implicitly all the theories and speculations of Galen, and seldom ventured in the smallest degree to deviate from his practice, we are indebted to them for the description of some diseases, which either made their first appearance about this time, or had not been before specifically noticed.†

We have to notice, in this place, a curious occurrence in the history of science, and one which indirectly produced a very important effect upon the subject of this dissertation—the invention of chemistry. The origin of chemistry, like that of all other sciences, is obscure and uncertain. Traces of what may be called chemical operations are to be found even among the Jews and Egyptians, but it is generally admitted that they are to be regarded as incidental occurrences, depending upon accidental observations, pursued no further than the object immediately in view, and not considered, even by those who practised them, as more than mere insulated facts, leading to no general principles nor to any farther investigations. The practice of chemistry as a distinct pursuit seems to have originated with the Arabians, and by them was made subservient to the purposes of medicine. (*Freind*, pars 2, sub init. *Sprengel*, t. 2. p. 246-266.) It is not our business to inquire into the mode in which this art took its first rise, or to trace its subsequent progress, except so far as may be connected with our present subject; and this will be the most conveniently accomplished by giving in succession a brief account of the most distinguished writers who belonged to the Arabian school of medicine.

The earliest Arabian writer on medicine of whom we have any certain account, would appear to be Ahrun, who was a priest at Alexandria. He published a treatise entitled "Pandects;" it has not come down to us, but it deserves to be noticed as it is said to have contained the first description of the small-pox. He was contemporary with Paulus, and from the account of his works which has been transmitted to us by Rhazes, we may conclude that the science of medicine was cultivated at that time with at least as much success among the Arabians as among the Greeks. During the next three centuries, although we meet with the names of many individuals who acquired a certain degree of temporary celebrity, we have none who rendered themselves so far pre-eminent as to entitle them to particular notice in this brief sketch. The first author of whom it will be necessary to give any distinct account is Serapion; he lived in the ninth century, and is said to have been a native of Damascus. His treatise entitled,

* *Freind*, Hist. Med. p. 398 et seq., and p. 420 et seq. Opera a Wigan, Lond. 1733. *Eloy*, "Paul d'Egine." *Haller*, Bib. Med. t. i. p. 311-15.

† For an account of the Arabian school of medicine generally, the reader is referred to Freind, who treats upon every thing connected with it in the most ample manner. See also *Barchusen*, diss. 17, sec. 12 et seq. *Sprengel*, sect. 6, ch. 5. *Cabanis*, sec. 6.

according to the fancy of the translators, "Aggregator," "Breviarium," or "Therapeutica Methodus," was written originally in Syriac; its professed object was to give a complete system of the Greek medicine, and to incorporate with it the principles and practice of the Arabians. Like those of the rest of his countrymen, the greatest part of Serapion's work is taken from those of his predecessors, and particularly from Galen; but it contains some few novelties with respect both to doctrine and to practice; and in one point, the preparation and composition of medicines, as well as in the articles employed, we may notice a decided improvement. (*Haller*, Bib. Bot. t. 1, p. 183–9.)

At the same time with Serapion lived Alkhendi, a multifarious writer, who obtained a very high degree of celebrity among his contemporaries, perhaps more from the variety of his acquirements than from the excellence he attained in any particular department. He is said to have assiduously cultivated mathematics, and the various branches of natural philosophy as well as medicine; and among other subjects to which he particularly directed his attention, we find astrology expressly enumerated. In relation to his varied attainments, he was styled the subtile philosopher, the learned physician, and the Greek astrologer. As an example, both of the spirit of the age and of the genius of the individual, we may remark that Alkhendi applied the rules of geometrical proportion and of musical harmony to regulate the doses of medicine, and to explain the mode of their operation—a mistaken application of science, which, however gross it may now appear, we must reflect was not entirely exploded until long after the revival of letters.*

We now come to one of the most illustrious of the Arabian school, Rhazes. He was born at Irak in Persia, in the ninth century; is described as a person of varied acquirements, as being well versed in general science, and, as his writings demonstrate, of unwearied industry. There is some reason to doubt whether the principal work which has been transmitted to us under his name, entitled "Continens," is precisely in the form in which it was left by its author; but there appears to be sufficient proof of its general authenticity to enable us to deduce from it, as well as from his other acknowledged works, an ample and correct view of the opinions and practice both of Rhazes himself and of his contemporaries. For the most part, the writings of Rhazes are deficient in method and arrangement, and they consist principally of abstracts and comments on Galen and the Greek physicians; but they also contain observations that appear to be original, and we even meet with the description of some diseases which were either new, or at least were not noticed by the ancients. Rhazes gives us a correct and elaborate description of the small-pox and measles, detailing the theory which was formed of their nature and origin by the Arabians, and the treatment which they employed. The most curious and original work of Rhazes is his "Aphorisms," in one part of which he professedly gives the result of his own observation and experience. But even this treatise, which was long regarded as of the highest authority in the schools of medicine, contains little that is really new or valuable; and when we compare it with its celebrated prototype, we cannot but be impressed with the very small advance which had been made in the science and practice of medicine during a space of nearly thirteen centuries. The most important additions which Rhazes made were, perhaps, rather in surgery and in pharmacy than in medicine strictly so called; and it is worthy of notice, that in the latter department we have some of the earliest indications of the free employment of what were styled the chemical remedies. (*Freind*, p. 483–91. *Haller*, Bibl. Med. Prac., lib. ii. § 135. *Eloy*, in loco. *Lauth*, p. 280–2. *Sprengel*, t. ii. p. 285–301.)

A short time after Rhazes lived Ali-Abbas, a writer of considerable celebrity, who obtained the appellation of the magician. His principal work, entitled "Opus Regium," professes to contain a complete view of the state of medicine in all its branches; it consists chiefly of abstracts of the doctrines and opinions of the Greek physicians, but along with these are contained some original observations. At the time of its publication it was very highly estimated, and perhaps may be considered as possessing more real value than most of the works that proceeded from the Arabian school. (*Freind*, p. 481. *Haller*, Bib. Med. lib. ii. § 137, t. i. p. 380. *Sprengel*, t. ii. p. 301–5.)

The fame of Ali-Abbas was, however, almost entirely eclipsed by that of Avicenna,† who flourished about a century later, and who rose to the highest pitch of celebrity, so as to be regarded by his countrymen as superior to Rhazes, or even to Galen himself. Avicenna was born at Bochara in the year 980, and was carefully educated in all the learning of the times, consisting principally of the Aristotelian logic and dialectics, with the imperfect mathematical and physical science, that was then taught in the schools of Bagdat. He appears to have been possessed of an ardent desire for acquiring knowledge, and of great industry, but united to a portion of fanaticism, indicative of a defective judgment, and fostered by the spirit of the age, which induced him to conceive himself under the influence of supernatural revelation. After a foundation of general science he entered upon the study of medicine, which he prosecuted with the same diligence and with the same spirit of enthusiasm. His reputation became so high that he was early introduced to the court, and for some years was without a rival in his profession. His death, which took place in his fifty-sixth year, was probably hastened by some political intrigues, in which he unfortunately became entangled.

The works which Avicenna left behind him are numerous, and embrace both general science and medicine. The former long maintained a high character for extent of information and profundity of learning, and according to the standard of the age were probably entitled to this commendation. But his fame, both with his contemporaries and with posterity, principally rests upon his great

* For an account of the earlier writers of the Arabian school, see *Freind*, Hist. Med. pars 2, sub init.

† The actual name of this individual is said to have been Al-Hussain-Abou-Ali-Ben-Abdallah-Ebn-Sina. *Sprengel*, t. ii. p. 305. In most cases it appears that the names by which the Arabians are generally known in Europe were not their real names.

medical work, entitled, "Canon Medicinæ," which may be regarded as a kind of encyclopædia of all that was then known of medicine, and of the sciences connected with it, anatomy, surgery, therapeutics, and botany. Its celebrity was so great as to have acquired for its author the title of prince of physicians; for some centuries it was the received text-book in most of the medical schools, both of the Arabians and the Europeans; until the revival of letters it superseded, in a great measure, the works even of Galen, it produced scarcely less numerous commentaries and epitomes, and had not entirely lost its authority two centuries ago. Yet the matured judgment of one of the most learned and candid of the modern critics has not hesitated to bestow upon this so much vaunted production the character of an ill-digested and servile compilation, containing little that is new either in the way of observation or of practice. Indeed, the sole aim of Avicenna seems to have been to collect matter from all quarters, without paying any regard to its value, or to the mode in which it was arranged. He was a devoted admirer of Aristotle and Galen, and seemed to imagine that the ultimate object either of the philosopher or the physician consisted in being intimately acquainted with their writings, and in defending them against all objections. Upon the whole, after making every allowance for the period in which he lived, it seems difficult to account for the very great credit which he acquired, not only during his life-time, but which was attached to his writings after his death; a credit so much greater than what they merit, either from the importance of the information which they contain, or the mode in which it is conveyed.*

There are two Arabian writers of the name of Mesue, whose celebrity entitles them to a brief notice in this place, although considerable uncertainty attaches to both their individual history and to their works. The elder of them is said to have lived in the eighth, and the younger in the tenth century; and they are both represented as being Christians of the Nestorian sect, but to have exercised their profession at Bagdat. The elder Mesue is principally remarkable as having been among the first who made correct translations of the Greek physicians, and especially of Hippocrates and Galen, into Arabic; for although he appears to have composed many original works, we do not find that they rose into any high repute even among his contemporaries. To the younger Mesue is usually ascribed a treatise on materia medica and pharmacy, which for a long time was in great estimation, and was republished and commented upon even as late as the sixteenth century; it probably contained a full view of the state of the science when he wrote, and is interesting, as it indicates the introduction of several new remedies into medicine; but in other respects it is to be regarded merely as a literary curiosity. (*Freind*, p. 481, 2. *Haller*, Bibl. Med. Prac. lib. ii. § 126. *Eloy*, in loco. *Enfield*, v. ii. p. 213. *Sprengel*, t. ii. p. 325.)

The last of the Arabians who acquired any considerable distinction as a writer on medical subjects, is Albucasis. So little is known of his personal history, that both his birth and the country in which he lived have been the subject of controversy, and appear to be entirely conjectural. His principal works are on surgery; and the reputation which he acquired in this department is almost as great as that of Avicenna in medicine. He seems to have been a man of learning and talents, to have made himself master of the writings and practices of his predecessors, and to have improved upon them. The description which he has left of his operations shows him to have possessed a degree of boldness and dexterity which could only exist in one who was well acquainted with his art, and had been habituated to the practice of it. His practice was what we should now consider as unnecessarily severe, making much more use of the knife and of the actual cautery than is done in modern times, and in all respects inflicting both more pain and more permanent injury on his patients. The works of Albucasis appear, however, to have afforded by far the most complete view of the practice of surgery which then existed; and from this circumstance, as well as from their real merit, they were, for many ages, considered as standard performances, and employed as the text-book in various schools and colleges. (*Freind*, p. 506–524, 2. *Haller*, lib. ii. § 148. *Eloy*, in loco. *Lauth*, p. 285, 6. *Sprengel*, t. ii. p. 327–32.)

It remains for us to give an account of two individuals, who, although natives of Spain, and residing principally in that country, were of Saracenic origin, and wrote in the Arabic language—Avenzoar and Averroes. Avenzoar was born at Seville, in the end of the eleventh century, and is said to have lived to the unusual length of one hundred and thirty-five years; but probably some error may have crept into this statement in consequence of both his father and his son having been, like himself, engaged in the practice of medicine. His principal work, entitled "Thaissyr,"† which consists in a general compendium of medical practice, displays more originality and discrimination than the writings of any of the native Arabians; so that, although he was professedly a disciple of Galen, he does not hesitate, on certain occasions, to shake off his authority when his opinions or practice were not sanctioned by his own experience. We may collect, from certain parts of his works, that he practised both surgery and pharmacy, as well as medicine properly so called; and we have many valuable observations on each of these departments. Upon the whole, we may consider Avenzoar as respectable both from his general character and his professional skill, and entitled to our regard as one of the improvers of his art. (*Freind*, p. 492–503. *Haller*, lib. ii. § 142. *Eloy*, in loco. *Sprengel*, t. ii. p. 332–7.)

Besides the reputation which Avenzoar derived from his own merits, he was perhaps still more known among his countrymen as being the preceptor of the celebrated Averroes. Averroes was a native of Corduba, and flourished in the twelfth

* *Freind*, lib. ii. p. 491–2. *Haller*, Bib. Med. lib. ii. § 139. *Eloy*, in loco. *Lauth*, p. 282–5. *Enfield*, v. ii. p. 222, 3. *Sprengel*, t. ii. p. 305–22. *Hutton's* Math. Dict., in loco. *Goulin*, Encyc. Méth. Médecine, "*Avicenne.*" "*Avicenne,*" in Biog. Univ.

† Freind designates the Thaissyr as "liber qui omnia victus et medicinæ præceptæ in plerisque morbis contineret:" p. 493.

century; he was of illustrious birth, and highly educated in all the branches both of literature and of science which were then taught in the Saracenic colleges of Spain. From certain political causes he was, in the early part of his life, the subject of religious persecution; but he succeeded in repelling the attacks that were made upon his faith, and was finally reinstated in all his former honours and in the public estimation. These circumstances, coinciding probably with the peculiar temperament of his mind, gave to his character a degree of ascetic gloom and austerity; but he appears to have been a man of distinguished worth and of superior abilities. Averroes' professional occupations were principally in a civil capacity; he is therefore to be regarded, not as a practitioner, but as a scholar who pursued the study of medicine as a branch of physical science. But such was his ardour in the pursuit of general knowledge, and the fondness which he manifested for this particular department, that he made himself intimately acquainted with it in all its details, and in his great work entitled "The Universal," he shows that he was not deficient in any part of the science which could be acquired by the mere study of books. As a philosopher he was a zealous and obscquious follower of the opinions of Aristotle, and as a physician, of those of Galen; he published many comments on both of them, which acquired the highest degree of reputation, and for many ages were considered as standard performances. Yet there is reason to suppose that he was ignorant of the Greek language, and, like his contemporaries, became acquainted with Aristotle and Galen only through the medium of Arabic translations. The great estimation in which the works of Averroes were held is proved by the number of editions of them which were published from time to time, one of which appeared at Venice so late as the commencement of the seventeenth century. With respect to his medical writings, as they do not profess to be the result of original observation, we cannot be surprised that their reputation is no longer supported. They are indeed entirely neglected; and it may be affirmed that, notwithstanding the celebrity which they once enjoyed, and which they so long maintained, they have not left a single permanent addition to the science.*

With Averroes terminated the Arabic or Saracenic school of medicine; after his time we have no writer whose name is sufficiently distinguished to deserve particular mention: even the study of the ancients began to be neglected, while no original observations were made, and no novel opinions or speculations were framed which might tend to excrcisc the mind or dissipate the darkness which now covered all parts of the world.

If we inquire into the causes of the great celebrity of the Arabian school of medicine, we shall be led to the conclusion that they were rather incidental and factitious than derived from its absolute merits. It has been justly observed that a considerable portion of this celebrity must be ascribed to the comparative condition of the neighbouring countries. From the eighth to the twelfth centuries was, perhaps, the period in which Europe was in the state of the most complete barbarism and superstition. The only remains of a taste for literature and science, or for the fine arts, were found among the Moors and Arabs; and it was from this source, by the intervention of the crusaders, and the intercourse which was thus effected between the Asiatics and the Europeans, that the philosophical and medical writings of the Greeks were first made known to the inhabitants of Italy and of France. And even after their introduction into Europe, it appears that they were for some time read only in Arabic translations, or in Latin versions made from these translations; so that it was not until a considerably later period that they were perused in their native language. Indeed so completely was the study of the Greek tongue suspended during the dark ages, that it may be doubted whether the writings of the ancient physicians might not have been entirely lost to posterity had they not been preserved in these translations.

There are, however, two points in which the Arabians conferred a real obligation upon their successors, the introduction of various new articles into the materia medica, and the original description of certain diseases. The additions which the Arabians made to pharmacy consisted partly in the vegetable products of the eastern or southern countries of Asia, which were only imperfectly known to the Greeks, and with which they had no intercourse. Among other substances we may enumerate rhubarb, tamarinds, cassia, manna, senna, camphor, various gums and resins, and a number of aromatics, which were brought from Persia, India, or the oriental isles. But a still more important addition which they made to the pharmacopœia consisted in what were styled chemical remedies, such as were produced by some chemical process, in opposition to those substances that were used nearly in their natural state. With respect to the origin of pharmaceutical chemistry, it may be sufficient to observe that a rude species of chemical manipulation appears to have been practised in Arabia in the fifth century, that distillation was performed, and that the metals were subjected to various processes, by which some of their oxides and salts were produced. The immediate object of these processes was the transmutation of the metals; an operation which, for many centuries, formed a main subject of attention to almost all the individuals who were considered as cultivators of natural philosophy.

With respect to the second subject alluded to above, the description of new diseases, it is well known, that from causes which are now altogether inexplicable, diseases of the most marked and distinct nature, which are the least liable to be mistaken or confounded with other affections, and which, had they existed, are too violent to have been overlooked, are not mentioned by the Greek and Roman physicians, and are described for the first time by the Arabians. Of these the two most remarkable are the small-pox and the measles. There is some reason to suppose that the small-pox had been known in China and the more remote parts of India at a much earlier period, but it is generally admitted that it was first recognised in the western part of Asia, at the siege of Mecca,

* *Freind*, p. 503-6. *Bayle's* Dict., in loco. *Moreri's* Dict., in loco. *Haller*, lib. ii. sect. 142. *Eloy*, in loco. Nouveau Dict. Hist. in loco. *Enfield*, t. ii. p. 226-231. *Sprengel*, t. ii. p. 337-41.

about the middle of the sixth century, when it raged with great violence in the army of the besiegers. We have remarked above, that the disease was alluded to by Ahrun shortly after its appearance, but it was Rhazes to whom we are indebted for the first clear and distinct account of its symptoms and treatment. There is no subject in the whole range of medical science of more difficult solution than that which respects the origin of diseases, especially such as, when produced, are propagated solely by contagion. Into this subject, however, it would be improper for us to enter in this place, as our readers will find it fully considered in the appropriate articles; it is here only alluded to as an historical fact, in connection with the writings of the Arabians.*

We are indebted to them for the transmission of the works of the ancient Greek physicians, to which they made certain additions of insulated facts with respect to the description of diseases, but with respect to the general principles of therapeutics the additions, if any, were few and imperfect. In anatomy they made no advances, and we have reason to suppose that the examination of bodies, either in a sound or morbid state, was scarcely practised by them. Medical theory was much attended to, but their theories consisted more in subtile refinements, formed upon the Aristotelian model, than in the study of pathology, or an accurate discrimination of the phenomena of discase. Some little advance appears to have been made in surgery by Albucasis, but he is the only individual who seems to have aimed at improving this branch of the profession; and it may be doubted whether the practice of surgery was not, upon the whole, in a retrograde state, during the period of which we are now treating. It is in the department of pharmacy alone that they made any additions of real value; and, although in this case it may be attributed more to accidental circumstances than to any enlightened spirit of improvement, yet it is incumbent upon us to acknowledge the obligation, which was both extensive and permanent.†

CHAPTER VII.—*State of medicine in Europe after the extinction of the Arabian school—Medical schools of Monte-Cassino and Salerno—Medicina Salernitana—Constantinus Africanus—Actuarius—Rise of the study of anatomy—Mondini—Gilbert—Effect of the crusades, of the reformation, and of the invention of printing, on the literature of Europe—On medical science—Alchemists—Establishment of universities—Linacre—Chemical physicians—Paracelsus—Appearance of new diseases.*

During the flourishing period of the Saracenic school of medicine, which may be considered as extending from the eighth to the twelfth century, the science remained nearly stationary, or was even retrograde among the successors of the Greeks and Romans. We have scarcely a single name of sufficient importance to arrest our attention, and we have no improvements to record, either in theory or in practice. The only attempts that were made in Greece or in Italy during this period, which deserve to be noticed, are connected with the Neapolitan schools of Monte-Cassino and of Salerno, which acquired some degree of reputation in the eleventh century. It was at this period that the physicians attached to the school of Salerno wrote the verses on dietetic medicine, entitled "Medicina Salernitana,' a work which, as afterwards published with the commentary of Arnoldus de Villanova, acquired considerable celebrity, and may be regarded as a valuable document, by its affording, in a small compass, a correct idea of the state of Italian medicine at that early period.‡

In connection with this subject we may notice Constantinus Africanus, who is supposed to have flourished about the end of the eleventh century. He was, as his name imports, an African; he possessed an ardent desire to obtain knowledge, studied in the schools of Bagdat, and is said to have travelled even to India. At his return to his native country he was regarded as a sorcerer, and was compelled, in order to save his life, to take refuge in Italy, where he was finally attached to the university of Monte-Cassino. He principally employed himself in translating the works of the Greek and Latin physicians into Arabic, which was at that time the general language of science. His translations are, however, said to be incorrect, and his style barbarous; while his works, which are not professed translations, appear to be composed of transcripts from other authors, without any particular merit, either of selection or of arrangement. (*Freind*, p. 533, 4. *Haller*, Bibl. Med. lib. iii. sec. 159. *Eloy*, in loco. *Sprengel*, t. ii. p. 355, 6.)

We must mention in this place a writer whose real name has not been transmitted to us, commonly called Actuarius, from the office which he bore in the court of Constantinople; (for the origin of the term, see *Adelung*, Gloss. Man., in loco). He is supposed to have lived in the twelfth century. The works which he left are numerous, and, although consisting principally of extracts from Galen and the Arabian physicians, with whose writings he appears to have been familiar, are not without some additions derived from his own observations and experience. He is considered as having been the first Greek physician by whom chemical medicines are mentioned, as well as various articles of the materia medica, which were originally introduced by the Arabians. We may regard Actuarius as a diligent collector of

* On the origin of the small-pox, see *Freind*, p. 52-49; *Mead's* Discourse on Small-Pox and Measles, ch. i.; *Thompson's* Enquiry into the Origin of Small-Pox; *Plouquet*, Literatura Digesta, "Variola, Antiquitas, Historia," in loco: ample references may be found in this learned and laborious compilation on all analogous topics, but we may regret that the writer appears to have aimed rather at multiplying his authorities than estimating their value.

† We are indebted to Freind for a candid and judicious account of the Arabian medical school, p. 529-33. *Haller's* second book of his Bibl. Med. Prac. is devoted to the same subject. See also *Robertson's* Charles V. vol. i. note 28. *Berrington's* Middle Ages, App. No. 2. *Gibbon's* History, vol. x. ch. lii. *Ackermann*, cap. xxvii-xxix. *Oelsner*, Des Effets de la Religion de Mahommed, p. 196-9; this is perhaps too much disposed to exalt the merits of the Arabian school. *Kühn*, Bib. Med. sec. 3. of what he styles "Fontes Medicinæ," is entitled, "Scriptores Medici inter Arabes præcipui," p. 180-6. *Portal*, Hist. Anat. ch. ix. 'Des Anatomistes et des Chirurgiens "Arabes."

‡ *Haller* ascribes the Latin verses of the Medicina Salernitana to John of Milan; he remarks that of this work there had been published "editiones ferè innumerabiles;" Bib. Med. lib iii. sec. 140. See also *Eloy* t. ii. p. 599; *Ackermann*, sec. 422, and *Blumenbach*, sec. 114

facts, acquainted with all the information of his age, and as more free from prejudice and bigotry than the generality of his contemporaries. (*Freind*, p. 452–462. *Eloy*, in loco. *Sprengel*, t. ii. p. 241–4.)

After the extinction of the Saracenic school of Spain, we have an interval of about three hundred years, from the twelfth to the fifteenth century, during which what are termed the dark ages still remain enveloped in the deepest gloom; every department of science was neglected, and among others that of medicine fell into its lowest state of degradation. What remained, either of literature or of science was in possession of the monks, who were themselves grossly ignorant, and whose interest it was to preserve mankind in the same state of ignorance. The exercise of the medical profession was principally in their hands, and they still adhered for the most part to the doctrines and practice of Galen, but with these they mixed up a large portion of superstition, and had not unfrequently recourse to magic and astrology. By these means they obtained an unbounded influence over the minds of the people, and operated so powerfully on the imagination of their patients, as in many cases to give an apparent sanction to their confident assumption of supernatural agency.—(*Sprengel*, sec. vii. ch. i.) The only branch of science which was cultivated with any ardour or success, was chemistry. The chemistry of these times can indeed only be interesting to us, as having led indirectly to the discovery of various substances which have been found of great importance in medicine, to which we have already referred. Its immediate objects were two-fold, the transmutation of the baser metals into gold, and the discovery of what was termed a universal medicine, which should possess the property of removing all diseases, and preserve the constitution in a state of health and vigour; objects which it is unnecessary to observe were completely vain and illusory. Yet by promoting a spirit of research, and by making the experimentalist acquainted with the various forms and properties of the substances on which he operated, they gave him some insight into the physical laws of matter, and by a gradual although very slow process, laid the foundation of the splendid improvements of modern science. Many of the alchemists of the dark ages, we can have no doubt, were impostors of the lowest description, who were completely aware of the folly of their pretensions; but at the same time there were others who appear to have been the dupes of their own credulity, and who bestowed a large portion of their time and fortune upon these researches. Between these two extremes there were some rare cases of individuals who may be entitled to hold an intermediate rank, who were sincere and honourable in their views, and without giving full credit to the professions of the alchemists, conceived that the objects at which they aimed were at least not altogether impossible. To these we may add another class of individuals, consisting of that singular and unaccountable compound of knavery and folly, which is not confined to the subject now under consideration, where it is extremely difficult to draw the line between these two qualities, or to decide which of them forms the predominant characteristic.

The school of Salerno, to which we have referred above, obtained a degree of celebrity from its local situation, this city being one of the great outlets from which the crusaders passed over from Europe to Asia in their expeditions to Palestine; and it was probably from this circumstance that Robert of Normandy stopped at Salerno, in order to be cured of a wound which he had received in the holy wars. It was on this occasion that the verses mentioned above, and which were addressed to him, were written. Upon the decline of the Saracenic universities of Spain, the only medical knowledge which remained was in Italy, where a few individuals, who were not of the ecclesiastical profession, continued to comment on Galen and Avicenna, and occasionally to deliver lectures; but we have a long dreary interval, in which there is nothing to arrest our attention, or to relieve the dull monotony of ignorance and superstition.

During this period the school of Salerno still retained its reputation, and was even favoured with especial privileges by the emperors; but its merits were probably rather comparative than absolute, for we do not find any improvements that emanated from it, nor any authors whose writings maintained their celebrity after the age in which they were produced. It is, however, in one respect deserving of our notice, as it appears to have been the earliest establishment in which what may be styled regular medical diplomas were granted to candidates, after they had passed through a prescribed course of study, and been subjected to certain examinations. The regulations are upon the whole judicious, and display a more enlightened and liberal spirit than might have been expected in that age, when the human mind was in so degraded a state. (*Freind*, p. 535–7. *Eloy*, art. "Salerne." *Lauth*, p. 291, 2. *Ackermann*, cap. xxxi.) The school of Salerno maintained its celebrity until the thirteenth century, when it was eclipsed by the general diffusion of medical science through Europe, and more particularly by the rising reputation of the universities of Bologna and Paris.

It was about this period that we may date the commencement of a practice which has eventually proved of the greatest importance to medical science in all its departments—the study of human anatomy. We have already had occasion to remark that the ancients, even in their most enlightened ages, seldom if ever ventured to examine the human subject, but were content to derive their knowledge of it from the dissection of animals which were supposed the most nearly to resemble it, making up the deficiencies by the casual examinations which were afforded them by accidents or diseases, and perhaps more frequently by supposed analogies, or rather by the efforts of the imagination. The individual to whom the credit is ascribed of having so far overcome vulgar prejudice as to have introduced this most important improvement into his art, is Mondini, a professor in the university of Bologna, who is said to have publicly dissected two female subjects about the year 1315, and who published an anatomical description of the human body, which appears to have had the rare merit of being drawn immediately from nature. This work deservedly obtained a high reputation: for three hundred

years it was considered as a standard performance, and was used as a text-book in the most celebrated of the Italian universities. Mondini is also entitled to the gratitude of posterity for having given a very early, if not the first example of anatomical plates; the figures were cut in wood, and although, as might be supposed, they were not executed with much elegance or delicacy, they are said to have been correct and expressive.*

About the same time with Mondini lived Gilbert, surnamed Anglicanus, a writer who must be considered as peculiarly interesting to us, from his being the earliest English physician whose name is sufficiently celebrated to entitle him to a place in the history of medicine. There has been much controversy respecting the date of his birth; but it appears the most probable that he flourished in the beginning of the fourteenth century. At this time medical science, as well as all other kinds of knowledge in this country, was in a state of the lowest degradation. There were no public means of instruction in any of the branches of natural philosophy. The light of science, which had dawned in the south of Europe, had not yet extended to the remote shores of Britain, and the learning of the age, which was confined to the monks, consisted entirely of scholastic disquisitions and the disputations of polemical theology. We are not therefore to expect, in the writings of Gilbert, much of genuine philosophy or of real science; his principal work, which is entitled "Medicinæ Compendium," consists chiefly of subtile distinctions, disquisitions respecting trifling and insignificant topics, with minute divisions of his subject, which lead to no useful purpose or general conclusion. His medical theories are principally taken from Galen, while his mode of reasoning proceeds upon the technical principles of the Aristotelian dialectics; he adopts the former without discrimination, and employs the latter without judgment. He frequently refers to the Arabian physicians, and there is some reason to suppose that it was through their means, *i. e.* through the medium of the Latin translations of their writings, that he made himself acquainted with the opinions of Galen. (*Wurton's* Hist. of Eng. Poet. v. i. p. 443.)

But although we are compelled to pass this general censure upon the works of Gilbert, justice demands it of us to admit that his defects may be fairly ascribed to the age and country in which he lived, and that he deserves great commendation for the attempt which he made, however imperfect it may have been. Nor are his works entirely without merit or originality; he has described some diseases in such a manner as to show that, under more favourable circumstances, he might have excelled in the art of making observations; he occasionally gives us some particulars of his practice, which prove that he was capable of exercising a correct judgment in the treatment of the cases which were submitted to him, and we are indebted to him for some additions to the materia medica, and for some improvements in pharmacy. (*Freind*, p. 547–50. *Eloy*, in loco. *Aikin's* Biog. Mem. of Med. in Gt. Brit. p. 8, 9. *Sprengel*, t. ii. p. 402–6.)

About this period, a grand political revolution was commencing in Europe, which eventually produced an entire change in the civil condition of its inhabitants, and indirectly affected, in an equal degree, its science and its literature. The feudal system, after being firmly established for some centuries, began to be shaken, perhaps in the first instance by the crusades. These expeditions, although undertaken from a spirit of gross superstition and bigotry, yet by giving a degree of excitement to the mind, and still more by making the crusaders in some degree acquainted with the literature of the Arabians, laid the foundation for subsequent improvements. There has been much controversy, not only respecting the absolute merit of the Arabian literature, but respecting the influence which it had on that of Europe. On the first of these points, so far at least as regards the medical sciences, we have already offered a few remarks; and on the latter we may observe that at the period of the crusades, whatever may be our estimate of the absolute merit of the Saracenic schools of learning, they were undoubtedly superior to those of the Christians, if indeed these latter can be entitled to the appellation. The armies of the crusaders were certainly not the best adapted either for appreciating the learning of the countries which they invaded, or for transferring any portion of it to their own; but still an intercourse of two or three centuries could not fail of having produced some effect, and in fact we know, not only that Arabian books were read and studied in Italy and France, but that it was almost exclusively by the medium of these books that the knowledge of the Greek and Roman authors was kept alive.†

The advantages which were derived to the Europeans from their intercourse with Asia, were, however, of but little moment compared to the great events to which we alluded above. The first of these was the capture of Constantinople, in the middle of the fifteenth century, by Mahomet the Second. The Greek monasteries of this city had been for some time the refuge of the learned men who had been driven from Italy by the perpetual wars in which that country had been so long engaged. They had taken with them, what they considered as their most precious treasures, the manuscripts of the ancient classical writers, probably regarding them more as objects of curiosity than of real importance. These manuscripts had now been buried for a long time in their libraries, their existence being unknown to the rest of the world, when the monks were expelled from their retreats by the Turkish conqueror, and, flying into Italy, carried back with them their classical manuscripts. A spirit of improvement had already begun to manifest itself in this country, which was considerably incited by their guests, who in their turn, by their change of situation and by the new society into which they

* *Freind*, p. 546. *Haller*, Bibl. Anat. sec. 120, t. i. p. 146, 7. *Eloy*, in loco. *Portal*, Hist. Anat. t. i. 209–16. *Sprengel*, t. ii. p. 432–4. *Douglas*, Bibliogr. Anat. p. 36–9. *Blumenbach*, sec. 118.

† *Gibbon*, ch. lxi. *Sprengel*, sect. 7, ch. iii. We must remark that the opinion expressed in the text respecting the influence of the crusades on the literature and science of Europe, differs in some degree from that of Mr. Mills, as stated in his interesting work on the Crusades, v. ii. p. 354–68.

were introduced, became more aware of the value of their literary treasures; while their own acquirements, limited as they were, gave them a degree of respect with their new associates which tended to inspire them with a desire of further improvement. (*Ackermann*, ch. xxxii. *Cabanis*, § 7.)

The other event to which we referred, and which occurred about thirty years after the destruction of the Byzantine empire, was one of infinitely more importance both in its immediate and its ultimate effects. Considered in all its bearings, both moral and political, it may probably be regarded as the most important which has ever occurred in the history of civilized society. Our readers will not need to be informed that the great event to which we refer is the Reformation. Into the causes of this event, the motives of Luther and his associates, the difficulties with which they had to struggle, and the means by which they succeeded in overcoming these difficulties, it is not our business to inquire. It only remains for us to notice its effects on science, and more particularly on medical science. We have remarked above that a certain degree of mental exertion had begun to manifest itself in the fourteenth century, that this was in some measure brought into action by the excitement produced in consequence of the crusades, and that the minds of men were thus prepared to receive the great truths which were so powerfully impressed upon them by the reformers. The first effect, however, of the Reformation was rather unfavourable to the progress of science and literature. The attention was entirely absorbed by the violence of theological controversy, and the civil feuds which succeeded put a stop to the peaceful labours of the scholar and the philosopher. But if a temporary pause was thus produced, the subsequent advance was proportionally rapid. No sooner were the minds of men delivered from the thraldom of theological bigotry, than they felt a strong impulse to free themselves from the tyranny of opinions on all other subjects in philosophy; and although it still required the lapse of some centuries to shake off the undue authority of Aristotle and Galen, and to form a fair estimate of their real merits, they were at least regarded as fair topics for discussion, while innovators were every day rising up who ventured to question their infallibility without the danger of being stigmatized as schismatics and heretics. (*Enfield*, v. ii. book 8, ch. ii.)

The happy invention of the art of printing, "an art which derides the havoc of time and barbarism," and which fortunately occurred about the same period, most powerfully tended to co-operate with the labours of the reformers, both in religion and in science, by affording them the means of more readily communicating the result of their inquiries, and of preserving the records of knowledge from the danger which they had lately experienced of being totally lost or destroyed.* One of the first uses which was made of this important invention was not only the multiplication of the works of the ancient classics, which had been brought by the Byzantine monks into Europe, but, by making mankind sensible of their value, other works of a similar kind were eagerly sought after, and thus, in the course of a few years, manuscripts were discovered of almost all the classical writings of which we are now in possession. (*Gibbon*, v. x. ch. lxvi. *Warton*, passim. *Berington*, book vi. p. 478 et seq. *Shepherd's* Life of Poggio, passim. *Hallam's* Middle Ages, v. iii. p. 577 et seq.) The munificence, and even the voluptuous extravagance of Leo X. and the other Italian potentates, by the direct encouragement which they gave to literature and the fine arts, powerfully coincided with the current of public opinion. For although, by inciting the daring spirit of Luther to take those steps of open hostility against the papal authority which he probably little contemplated in the first instance, they produced effects very different from those originally intended, yet they must be considered as among the indirect causes which conspired to produce the great mental revolution of the fifteenth century.

The science of medicine in its various departments was not slow in partaking of the beneficial effects of the change which we have been describing. The writings of the Greek physicians, which had for some centuries been studied through the medium of Arabic translations, or even of Arabic commentaries, were now read in their original language or in correct Latin versions. It was found that Avicenna, Averroes, and the great luminaries of the Saracenic schools, had in many cases either misunderstood or perverted the doctrines and tenets of Galen, and his genuine writings now began to be substituted for the imperfect transcripts of them which had so long occupied their place. The works of Hippocrates were also printed in their original form; but it required a considerably longer period of mental education to enable the bulk of medical readers to appreciate his merits, so that, although various editions of his works were printed, and learned treatises written to explain them, Galen still retained the pre-eminence in public estimation.

A practice began to prevail about the fifteenth century which very materially contributed to advance the science of medicine, and especially the practical part of it,—the publication of monographs of particular diseases and of individual cases, with the reports of hospitals or other public institutions. This plan was not, indeed, altogether new, for we meet with narratives of cases even in Hippocrates; but it had been either misunderstood, or had been so much perverted from its original design and legitimate object as to have been rendered of little value. Many of these early collections, it must be acknowledged, were formed without judgment, and consisted rather of marvellous stories than of histories from which any practical inference could be deduced; but they served the purpose of inducing a habit of observation, and of directing the attention more to facts than to mere hypotheses. In each succeeding age we find this plan to have been more generally adopted, and at the same time to have been much improved in its method; so that we may undoubtedly consider it as one of the means by which medical knowledge has advanced so rapidly in modern times.

* For remarks on the scarcity and value of books, see Robertson's Charles V., v. I. ch. v. note 10; Warton's Hist. of English Poetry, passim; Berrington's Middle Ages, book vi. p. 507, 8.

Before we close our second period of the history of medicine, it will be necessary to make a few observations on the progress of chemistry, and on the influence which it had on medical science. We have already made some remarks on the rise of this science, and on the progress which it made among the Arabians, and have stated that it originated in the futile and sordid desire of converting the baser metals into gold. In its primary object it of course totally failed; yet in the numerous and laboured efforts which the alchemists made to accomplish their object, it is admitted that they acquired considerable information about the nature and properties of the bodies on which they operated, and thus produced various compounds, principally of a metallic nature, which were eminently useful in the arts of life, and especially in pharmacy. We farther owe to the Arabian chemists the discovery of the process of distillation, the art of preparing extracts; they introduced the use of sugar into pharmacy instead of honey in the composition of syrups and conserves: they seem to have made some approach to the formation of the mineral acids, and to have procured several of the earthy and neutral salts.

The art of alchemy was early transferred into the different countries of Europe, and was pursued with as much ardour as by the Arabians, and perhaps with even more superstition and credulity. Some of the alchemists acquired, during their lifetime, a high degree of popularity, and notwithstanding the unphilosophical nature of their occupation, are not altogether unworthy of notice in the history of science. Albertus Magnus, bishop of Ratisbon; Raymond Lully, a Spanish ecclesiastic; and Arnoldus of Villanova, a professor in the university of Barcelona, all flourished in the thirteenth century, and left behind them writings which, although they are encumbered with a mass of folly and mysticism, exhibit, in a certain degree, the spirit of philosophical research, together with an ample share of industry and patient investigation.* In the same age lived Roger Bacon: he may be classed among the alchemists, inasmuch as he adopted some of their principles and practices; but in the turn of his mind, and in the spirit with which he entered upon his experimental researches, he exhibited a genius which far outstripped the age in which he lived.† The philosopher's stone, which was the object of so much painful research, besides its property of producing gold, was supposed also to possess the power of curing all diseases, and hence obtained the title of the universal medicine. This vain and fantastical notion was indirectly the cause of some pharmaceutical discoveries; for to this we may consider ourselves indebted for the mercurial preparations, and for the experiments of Basil Valentine on antimony, which led to their introduction into medicine about the end of the fourteenth century.

Among the distinguishing features of the period at which we are now arrived, we must not omit to mention the various universities which were established in most of the great cities in the southern parts of Europe, of which the medical chairs, in most cases, formed a very distinguished part. We have already had occasion to mention the university of Salerno, which was the first of these establishments after the destruction of the Roman empire. The next in order of time appears to have been that of Montpellier, which is said to have been established not long after that of Salerno, and which acquired a high degree of reputation, which it maintained for many centuries. We are informed that Bologna had acquired considerable celebrity as a school of medicine in the thirteenth century; that about half a century later, medical lectures were delivered in the universities of Vienna and Paris; and that about the same time, medical schools were established in Padua, Pavia, Milan, Rome, and Naples, and most of the other cities of Italy, which each of them acquired a certain degree of reputation, necessarily varying with the abilities and characters of their professors, but all contributing to advance medical science, both by the actual acquisition of knowledge, and by the influence which they exercised in removing the undue veneration that was still paid to the writers of antiquity.‡ In the north of Europe, the progress of literature and science was much more tardy. The natural sciences were scarcely regarded as an object of attention, and medicine was still strictly confined to the study of the works of Galen, or even to those of his Arabic translators. The only exception of which our country can boast, is Linacre, a native of Canterbury, who, after studying at Oxford, travelled into Italy, and spent some time at the court of Florence, where he acquired a portion of that love of literature which so eminently distinguished the family of the Medici. On his return to England, he was appointed physician to the royal household, and employed his influence in establishing medical professorships in the universities of Oxford and Cambridge, and in forming the foundation of the London College of Physicians.§

From the various causes which we have mentioned, and probably from some others of less moment, a spirit of general improvement now began to manifest itself; the arts and sciences gradually revived; philosophy, in all its branches, was studied on a more correct plan and with a more enlightened object, and medicine was not slow in

* *Freind*, p. 543-5. *Bayle's* Dict. art. "Albert." *Eloy*, "Arnauld de Villeneuf," *Moreri*, art. "Albert." t. i. p. 269; and "Arnaud de Villeneuf," t. i. p. 346, 7. *Ackermann*, § 446, 7. *Berington*, book v. p. 370. *Sprengel*, t. ii. p. 437-443. *Blumenbach*, § 120-3. *Turner's* Modern History of England, book ii. chap. i. p. 7, 8.

† *Freind*, p. 537-543. *Campbell*, in Biog. Brit., in loco. *Bale*, Scrip. Illust. Brit. p. 342-4. *Cave*, Hist. Lit. t. ii. p. 324-6. *Bayle*, in loco. *Eloy*, in loco. *Berington*, book v. p. 373. *Hallam's* Middle Ages, vol. iii. p. 539, note. Nouv. Dict. Hist. in loco. *Sprengel*, t. ii. p. 397, 8. *Wood's* History of Oxford, by Gutch, vol. i. p. 332-344. *Enfield*, in Hist. Phil. vol. ii. p. 346-8; and in *Aikin's* Gen. Biog., in loco. *Suard*, in Biog. Univ., in loco.

‡ The dates of the establishment of the various universities may be found in *Eloy*, t. iii. p. 223. The learned work of Tiraboschi, "Storia della Literatura Italiana," contains the most ample information respecting the universities of that country. See also *Lauth*, Hist. d'Anatomie, liv. v. part iv. sec. 1. § 2.

§ *Freind*, p. 587-591. We here lose the assistance of this learned and judicious historian. *Eloy* in loco. *Cabanis*, p. 144, 5. *Sprengel*, t. ii. p. 8. *Aikin's* Biog. Mem. of Med. p. 28-47. In connection with Linacre, we may mention the name of Key, Kays, or, as it was Latinized, according to the custom of the times, Caius, whose liberality to the university of Cambridge deserves honourable mention. *Aikin*, in Biog. Anec. p. 103-136; and in Gen. Biog., in loco. *Eloy*, in loco.

partaking of the beneficial influence. One of the first symptoms of this improvement was an increasing relish for the writings of Hippocrates, and the revival of his method of studying and practising medicine. The taste for complicated theory and refined speculation gradually declined, and in the same proportion the value of correct observation and an accurate detail of facts began to be duly estimated.

A circumstance which tended in a considerable degree to shake the authority of Galen, and to diminish the veneration in which his opinions had been held for so many ages, was the rise of the sect of the Chemical Physicians. After chemistry had been used with advantage for the purpose of improving the processes of pharmacy, it was applied to the explanation of the phenomena of vitality, and of the operation of morbid causes upon the living system. The theories of these chemical physicians we now regard as altogether false and inapplicable; but they were advanced with so much confidence that they obtained many adherents, and for some time the opinions of the medical world were divided between the rival doctrines of the Galenists and the Chemists.

Among the most noted supporters of the chemical theory was Paracelsus, an individual whose claim to our notice depends more upon his consummate vanity and presumption than upon his abilities or acquirements. His professed object was to undermine the authority of the Galenists; and for this purpose he did not hesitate to hold forth the most absurd claims, and to practise the basest acts of quackery. He boasted that he had discovered the elixir vitæ, the universal remedy, of which mankind had been so long in search; and he publicly burned the writings of Galen and Avicenna, because, in consequence of his discovery, they were of no further use. It is somewhat difficult to determine in what degree Paracelsus was actually the dupe of his own folly; but whatever may have been his real opinion as to the efficacy of his elixir, his own death, at the early age of forty-eight, served to humble the confidence of his followers, and to reduce his reputation to its real standard.

But although the personal character of Paracelsus received an irreparable shock by this event, his doctrines continued to attract a number of zealous advocates. With respect to the nature of these doctrines, it will be necessary for us to say but a few words in this place. The leading principle of the Chemists was, that the living body is subject to the same chemical laws with inanimate matter, and that all the phenomena of vitality may be explained by the operation of these laws. The proofs which they adduced in favour of this principle, and the illustrations which they gave of the nature of these laws, were completely futile and unsatisfactory; and it may be asserted that the strength of their reasoning was much more apparent in the mode by which they attempted to controvert the hypothesis of the Galenists than in the direct arguments which they brought forward in favour of their own doctrine. In truth, the chemical elements of Paracelsus were at least as hypothetical as the physiological elements of Galen, and were even less applicable to the explanation of the vital actions of organized beings. The only obligation which we owe to the chemical physicians, is the introduction into medicine of certain substances, chiefly metallic preparations, which, in the hands of the more enlightened practitioners of modern times, have proved very valuable additions to the materia medica.*

After the death of Paracelsus, his peculiar theories fell into disrepute and were little attended to; but the sect of the Chemical Physicians continued to flourish even as late as the seventeenth century, when we meet with many examples of men of learning and sagacity, who attempted to explain the phenomena of the animal economy by the laws of chemistry. To the visionary speculations of the Chemists there was united a large portion of superstition and mysticism; and so much did this feeling coincide with the spirit of the times, that even the men who were the most illustrious for their learning and science were either actually infected with these notions, or did not venture so far to oppose the prevailing opinions of their contemporaries as to avow their disbelief of them. Astrology and magic were generally practised by the members of the medical profession, while various rites and ceremonies were observed, which implied the belief of supernatural agency, but which, by a singular inconsistency, was supposed to be a constant and necessary part of the process.

Before we conclude this portion of our subject, we must notice the remarkable circumstance, that about this period, during the fourteenth and fifteenth centuries, some very formidable diseases made their appearance in Europe, the origin of which is still very obscure, after all the discussion and investigation that has taken place respecting them. Among these, one of the most remarkable is what was termed the *sudor Anglicanus*, which is first mentioned about the end of the fifteenth century, and which, for about fifty years, raged at intervals with extreme violence in England and in some other countries in the west of Europe. (*Sennert*, De Feb. lib. iv. cap. 15. *Freind*, p. 567, 8. *Plouquet*, "Febris Sudatoria," t. ii. p. 162. *Cullen's* Synopsis, t. ii. p. 77, 8. *Sprengel*, t. ii. p. 491-4.) In the fifteenth century we have the first correct description of the hooping-cough; and from the manner in which it is spoken of by the contemporary writers, it would appear that it was considered by them as a new disease. The sea-scurvy, if not entirely unknown to the ancients, was at least not distinctly recognised until this period, so that, if it existed previously, we may conclude that it was less violent in its effects; a circumstance which has been ascribed, with great plausibility, to the spirit of naval enterprise which sprang up at this period, and which led to the undertaking of long voyages. (*Freind*, p. 583. *Sprengel*, t. ii. p. 494-6.)

The great number of establishments which were formed during the dark ages for the cure of leprosy, was at one time supposed to be a proof

* *Clerc*, p. 792 et seq. *Barchusen*, Diss. 19. *Conring*, cap. xi. sec. 16, 17. *Haller*, Bib. Med. t. ii. p. 2 et seq. *Eloy*, in loco. *Sprengel*, sect. ix. ch. 2. *Gabanis*, sect. ix. *Hutchinson's* Biog. Med. vol. ii. p. 197-209. *Enfield*, vol. ii. p. 451-4. *Aikin's* Gen. Biog., in loco. *Blumenbach*, Introd. sect. 169. *Renauldin*, in Biog. Univ. "Paracelse."

that it was a new disease in Europe, imported, as was imagined, from Asia by the crusaders. There has been much nosological discussion concerning the exact nature of the disease to which this term ought to be applied; whether there were actually two species of leprosy, one which was indigenous in the east, and another species in Europe. Some writers have conceived that a combination of the two was produced at this period, while others, again, have supposed that the disease had previously existed in Europe, but that, in consequence of the greater degree of communication between the different parts of it which was brought about by the crusades, the disease was either more extensively propagated, or at least was brought more into notice, and that more active means were therefore employed for its relief. (*Sprengel*, t. ii. p. 371-5.)

It was about the same period, when the western part of the old continent was in its lowest state of degradation, that we hear of the ravages of those varieties of fever emphatically styled the plague, which were described in the thirteenth, fourteenth, and fifteenth centuries as invading various parts of Europe and Asia, and sweeping away a large proportion of the inhabitants. (*Plouquet*, "Febris Maligna," and "Pestis," in loco. *Cullen*, t. ii. p. 74-7, 139-41.) The accounts which we have of these epidemics would indicate that they were not an absolutely new disease, but that the symptoms were modified and aggravated by the peculiar condition of the great bulk of the people; a conclusion which is confirmed by the fact, that, as the physical and moral condition of nations has been ameliorated, the occurrence of these diseases has become proportionally rare, so that we conceive them to be almost incompatible with the improvements in civilization and in medical police which exist in the greatest part of Europe.

But whatever may be our opinion concerning the origin of the leprosy and the plague, there is another disease where, from the peculiarity of its symptoms, its decidedly contagious nature, the ordinary method of its propagation, and the universality of its occurrence, we are enabled to fix the date of its appearance in Europe with more certainty. It is now generally agreed that it was near the close of the fifteenth century that the symptoms of syphilis were first recognised in Italy, from which country the disease very rapidly extended over the whole of Europe. Concerning its primary origin much controversy has taken place; many writers have attempted to prove that it was brought into Europe from America by Columbus; but this opinion, which was at one time pretty generally received, is now abandoned, nor are we able to offer any plausible conjecture respecting its introduction from any other quarter.

The same difficulty indeed exists in this case as in that of all those diseases which are produced by no cause except by a specific contagion. Almost every individual is obnoxious to them upon the application of this cause, and this liability appears to be little affected by constitution, age, habits of life, climate, and other external circumstances. The question is, how were they first produced? It is impossible to imagine that the first created individual was born with all these diseases upon him, yet we know of no distinct cause now in operation which could, in the first instance, have generated them. These remarks apply to the small-pox and the measles, which, as was stated above, were first known to the Europeans about the middle of the sixth century, and it applies perhaps, still more remarkably to the case of syphilis. This point must be regarded as one of those mysteries of which at present we are unable to offer any solution. It is true that the manners of the age in which this disease is recorded to have first made its appearance were grossly licentious, and in many respects unfavourable to health; but still we see no satisfactory reason why the specific poison of this disease should have been generated; yet it appears impossible to conceive that, if it had previously existed, it could have remained for any length of time unknown or undescribed.*

We have now brought down our sketch of the history of medicine to the period when the light of improvement was bursting forth from various quarters, when men were engaged in the investigation of the different departments of science upon a plan which, although not free from error, was more correct than that of their predecessors, and which by a slow but steady process led to the establishment of those principles which eventually produced the complete triumph of truth and philosophy over error and superstition.

CHAPTER VIII.—*General view of the state of medicine during the sixteenth century—Revival of the Hippocratean school—Account of the Galenists—The Chemists—The Anatomists—Vesalius, Fallopius, Eustachius.*

We have already given an account of the manner in which the taste for the classical writers of antiquity was gradually developed during the fifteenth century, and we stated that in medicine, as well as in the other departments of science, the Greek writers began to be studied in the original instead of their being read through the medium of translations and commentaries. As this taste was further matured, the works of Hippocrates continued to rise into estimation in preference to those of Galen, and a new school of medicine was formed, which obtained the name of Hippocratean, the professed object of which was to proceed upon the inductive principle, of first ascertaining facts, and by their generalization to form the theory. That in every instance they adhered to this plan we cannot affirm; indeed we have too many instances where they forgot or misapplied their own principles, but still the importance of accurate observation was generally admitted, and although mankind could not at once abandon their former errors, they became aware of their existence, and of the method by which they might be corrected.

The contest between the Galenists and the Chemists, which agitated the whole medical world during the fifteenth century, was indeed still maintained through the sixteenth; but it was conducted upon more rational principles, and by men of more enlarged and more enlightened views.

* *Freind*, p. 568-583. *Astruc.* De Morbis Veneriis. *Hunter.* on the Ven. Dis. p. 9. 10. *Sprengel*, t. ii. p. 499 et seq. *Plouquet*, "Syphilis, Historia" &c. in loco. *Black's* Hist. of Medicine, p. 146-155.

The Galenists were for the most part more scientific and learned than their adversaries; they consisted of the professors in the universities, and what may be styled the regular practitioners; and although they were still strongly attached to the tenets of their master, they did not omit to collect facts and to watch the phenomena of disease. Their practice may be characterized as being at the same time complicated and inert; their materia medica was principally taken from the vegetable kingdom, while their prescriptions were long and multifarious, consisting of a prodigious number of articles, combined together in such a manner as to render it almost impossible to conceive the probable operation of the compound, their indications at the same time being derived from an incorrect hypothesis, and being often either unintelligible or impracticable.

The Chemists were the bold empirics of the day, without learning or experience; but they endeavoured to supply the deficiency by confidence and temerity, and by these formidable weapons they frequently triumphed over their adversaries. They discarded the long prescriptions of the Galenists, rejected many of the articles of their pharmacopœia, while they introduced the active metallic preparations, and made free use of the most powerful remedies of all kinds. The rival sects mutually upbraided each other with the injurious effect of their respective plans of treatment, and probably there was but too much foundation for their accusations; for if on the one hand the Chemists, by their rashness, committed many fatal blunders, the Galenists, by their feeble remedies, must have frequently failed in subduing disease or arresting its progress.

It appears that upon the whole the Chemists, like the analogous characters in the present day, acquired a greater share of popularity than their opponents. Their arrogant pretensions, the more decisive and intelligible nature of their indications, coupled with the artifices which they practised for the mere purpose of acquiring popularity, gave them a decided advantage over their more learned and more dignified rivals, who were both unable and unwilling to contend with them in the race of empiricism. By degrees, however, the chemical physicians rendered themselves more worthy of the public estimation, by making themselves better acquainted with the principles and practice of their art; the search after the philosopher's stone was gradually abandoned; and although many of the doctrines which they still professed were altogether unfounded, they were less palpably absurd than those of their predecessors.

Another circumstance occurred about the period of which we are now treating, which contributed to produce a most important reform in the science of medicine — we refer to the study of human anatomy. With a very few exceptions, which have been noticed above, during a space of more than a thousand years, since the death of Galen, very little advance had been made in our acquaintance with the structure of the body. The professors of the Arabian school, with their successors in Italy and France, for the most part contented themselves with copying the descriptions of the ancients, without ever calling in question their accuracy, or endeavouring to confirm or refute them by their own observations. Even after the examination of the human subject had been practised for some time, and its necessity generally acknowledged, it was long before mankind could so far free themselves from the tyranny of authority as to admit that any imperfection could exist in the works of Galen, or that his descriptions were not to be preferred even to the evidence of the senses.

In reviewing the state of medical science during the sixteenth century, it will assist us in our progress if we arrange the principal authors under the three classes of the Physicians strictly so called, the Chemists, and the Anatomists. Under the first head we propose to include both the writers who still adhered implicitly to the tenets of Galen, and those who, paying less regard to mere authority, devoted themselves more to observing the phenomena of disease and the effects of remedies, and who may be considered as having laid the foundation of the modern Hippocratean school. Of these, some of the most distinguished by their character or writings were Cornarus and Mercurialis in Italy, Hollerius, Fernel, and Duret in France, Lommius and Forest in Holland, Sennert, Plater, and Foës in Germany, and Linacre in England. (*Sprengel*, t. ii. passim. *Cabanis*, ch. ii. § 10.)

The limits to which we are confined will not permit us to enter into any detail of the individual merits of these authors, or into any analysis of their writings or opinions. For the most part they were possessed of a competent knowledge of ancient literature, and well acquainted with the works of the Greek physicians; many of them were professors in universities or teachers of medicine, and engaged in extensive practice. They were generally diligent collectors of facts, and many of them voluminous writers, either publishing their own observations, or commenting on the ancients. Their practice was in a great measure taken from Galen, with the additions that had been derived from the materia medica of the Arabians, and in a few instances from the Chemists; but these latter were regarded as dangerous and empirical, and it was not until they had been long sanctioned by popular use that they were received into the authorized pharmacopœias. The actual advance which the practice of medicine received from these authors was not very considerable; but by their learning and diligence and their general respectability they contributed to raise the character of the profession, and to prepare the mind to receive the improvements in science which were gradually unfolded in the next century, and to apply them to the department of medicine.

With respect to the Chemists of this period, although they composed a numerous and active body, yet there is none of them whose name is sufficiently distinguished above his fellows to require being particularized in this place. As science and knowledge gradually advanced, the absurdity of their speculations was more generally perceived, and their pursuits were either abandoned, or were directed by a more philosophical spirit; and although the search after the universal medicine was not entirely discarded, they began to occupy themselves with inquiring into the chemical constitution of the body, and investiga

ting the changes that were induced in it by disease. This investigation was indeed attended with little success; their experiments were crude and imperfect, and their modes of analysis altogether inefficient. But still some important observations were made, and new processes were invented, and the foundation began to be laid for the more enlightened views of their successors in the succeeding century.

But the benefit conferred upon the science of medicine by the labours of the Chemists was trifling and uncertain compared to the great and direct advance which was produced by the researches of the Anatomists. Some attention had been paid to the structure of the body by the earlier Italians, and they had even ventured, in a few instances, to dissect the human subject; yet scarcely any discovery or any improvement deserving of notice had been made for many ages, when Vesalius, about the middle of the sixteenth century, entered upon his career of inquiry. He was the first anatomist who threw off the yoke of authority which had been imposed by a blind veneration for the opinion of the ancients, and who ventured to conceive the possibility of error in the writings of Galen. Vesalius prosecuted his researches with unwearied diligence, and disregarding the obloquy which was heaped upon him, he succeeded in publishing an anatomical work, which at this day we behold with admiration, and which maintains its character as a faithful transcript of nature. (*Eloy*, "Vésale." *Haller*, Bib. Anat. lib. 4, § 163. t. i. p. 180 et seq. *Sprengel*, t. iv. p. 5-9; *Douglas*, Bibliogr. Anat. p. 64-73. *Renauldin*, in Biog. Univ. "Vésale.")

But the reputation of Galen was too firmly established to be affected in any considerable degree by the observations of any single individual, however highly he might be entitled to the respect of his contemporaries. Long and acrimonious discussions occurred between the defenders and the opposers of Galen, some maintaining that his descriptions of the parts of the body were absolutely perfect, while others undertook to prove, by direct and palpable facts, that Galen's knowledge of the human form was not complete. It was asserted, on the one hand, that he had seldom examined the human subject, and that his descriptions were frequently taken from apes and monkeys; an imputation which was firmly denied by his zealous advocates. Eustachius, Fallopius, and others of great and deserved reputation for their anatomical skill, undertook the defence of Galen; and it was not until after a long and severe struggle that the truth was established, and that it was agreed that the anatomy of the ancients was in many parts imperfect, and that the errors which had been pointed out by Vesalius actually existed.* It would be foreign to our purpose to enter into a minute examination of the labours of the individual anatomists, or to mention in detail the successive improvements which were effected in their department. With respect to the practice of medicine, which is our more immediate object, it does not appear that they effected any direct improvement, but they contributed indirectly to its advancement in no small degree by completely establishing the important point that the opinions of the ancients were not to be considered as infallible, but were to be subjected to the ordeal of free inquiry.

CHAPTER IX.—*State of medicine during the seventeenth century—The chemical and mathematical sects—Progress of anatomy—Fanatics—Chemical physicians—Sylvius—Willis—Sydenham—Mathematical physicians.*

All the changes of opinion which we have described as occurring in the sixteenth century continued to advance with an accelerated progress during the seventeenth. The preference which was given to Hippocrates over Galen was daily gaining ground, and, as the consequence of this, the habit of correct observation was confirmed, and the value of the observations was more justly appreciated.

In the mean time, anatomy was making rapid strides. Being a science which depended more immediately upon the accumulation of matters of fact, which required for their attainment little more than industry and mere observation, errors were more readily discarded than on those subjects in which much reasoning was necessary, and in which it was rather an inference from facts than the facts themselves, which constituted the object of the investigation. The investigations of the anatomists extended to every part and structure of the body; the forms and textures of the bones, the muscles, the nerves, the vessels, and the various viscera, were each in their turn made the subject of particular and minute examination by some of the eminent men of the age. These labours were amply rewarded by the splendid discovery of the circulation by the immortal Harvey, and of the absorbent system by Asselli, Rudbeck, and Bartholine; while the structure and office of the lungs, and the relation which it bears to the heart, were explained by Malpighi, Hooke, Mayow, and their associates.†

With respect to the chemists of this period, their opinions were gradually disengaged from the tissue of mystery and credulity in which they had been so long involved, when about the middle of the century the science was finally placed upon its correct philosophical basis by the genius of Boyle. He correctly regarded it as an investigation into the change of properties which bodies experience by their action upon each other, and he pursued the investigation, not by presupposing the existence of certain occult causes and hypothetical agencies, but by an accurate examination of the effects which bodies actually produce upon each other when placed within the sphere of their mutual action.‡

It is, however, not a little remarkable that while the science of chemistry generally, and more especially the sect of the Chemical Physicians, was purifying itself of its grosser errors, we meet with not unfrequent instances where it continued to be

* *Haller*, Bib. chir. lib. 5, "Schola Italica;" and Bib. Anat. lib. 5. "Schola Italica." *Fallopius*, § 200, t. i. p. 218 et seq. *Eustachius*, § 205, t. i. p. 233 et seq. *Douglas*, Bibliogr. Anat. in Fallopio, p. 94-96, et in Eustachio, p. 98-100

† The fourth volume of Sprengel is principally occupied with a luminous view of the anatomical discoveries of this period.

‡ *Campbell*, in Biog. Brit. in loco. *Haller*, Bib. Med. lib. ix. sect. 702, t. iii. p. 109-13. *Nicholson*, in Aikin's Gen. Biog., in loco. *Morell*, in Brewster's Encyc., in loco. *Suard* et *Cuvier*, in Biog. Universelle, in loco.

combined with a singular degree of fanaticism. There was indeed no period, since the time of Paracelsus, when there were more remarkable examples of the prevalence of this spirit, and in no country were they more notorious than in England. The writings of Fludd, who practised in London in the early part of the seventeenth century, afford a curious compound of learning and folly, of profound erudition, united to an implicit faith in astrology, and in all the cabalistic opinions of the Jewish doctors.* Perhaps a still more remarkable example of this combination is that of the celebrated Kenelm Digby, a man of rank and of refined education, who during his travels on the continent became initiated into this mysterious chemical philosophy, and on his return gave a specimen of his opinions by publishing an account of the virtues of the sympathetic powder.† Another of these individuals who obtained great celebrity was Valentine Greatrix, who cured all diseases by the imposition of the hand, and who even ventured to oppose his power in this respect to the royal touch of Charles.‡ These circumstances are interesting, not merely as forming a part of the history of medicine, but as displaying a singular feature in the history of the human mind; demonstrating the difficulty which exists in eradicating from it errors and follies even the most gross and palpable, when they have once become deeply rooted.§

While what may be more strictly termed chemistry was advancing into the state of a science, a combination was formed between its principles and those of physiology, which gave rise to the new sect of the Chemical Physicians. Their leading doctrine was, that the operations of the living body are all guided by chemical actions, of which one of the most important and the most universal is fermentation. The states of health and of disease were supposed to be ultimately referable to certain fermentations, which took place in the blood or other fluids, while these fluids themselves were the result of specific fermentations, by which they were elaborated from the elements of which the body is composed. Again, certain humours were supposed to be naturally acid, and others naturally alkaline, and according as one or the other of these predominated, so certain specific diseases were the result, which were to be removed by the exhibition of remedies of an opposite nature to that of the disease in question. According to the theory of the Chemical Physicians, fever was supposed to originate in an acid condition of the humours, and was consequently to be cured by alkalies; and in conformity with what is so often found to take place in tracing the history of medicine, they discovered that alkalies were actually the most efficacious remedies for fever.

The individual who may be considered as having first given a connected and consistent view of the theory of the medical chemists, is Sylvius. He was born at Hanau, in Flanders, in 1614; he graduated in the university of Basil, practised for some time at Amsterdam, and finally was appointed to fill the chair of practical medicine at Leyden, where, by his genius and eloquence, he acquired a high degree of popularity. From this circumstance, his peculiar opinions obtained a very extensive circulation, and the hypothesis of fermentation, with the acid and alkaline states of the fluids, after some time became the fashionable doctrine of the French and German physicians, and had many zealous defenders in our own country.‖

One of the most respectable of the advocates of the chemical doctrines of medicine, was our learned countryman Willis. He was only a few years younger than Sylvius, and was early in life attached to the science of chemistry, which he afterwards applied with much ingenuity to the explanation of the functions of the animal economy. In the year 1659 he published his celebrated treatise on fermentation and on fever, the object of which is to prove that every organ of the body has its peculiar and appropriate fermentation, and that a morbid state of these ferments is the cause of all diseases. The hypothesis is in itself totally false, but it is supported by considerable ingenuity, and his works are of real value, as containing an accurate account of the phenomena of disease. Willis was also the author of some treatises of very considerable merit on the nervous system, and on various physiological topics, by which his reputation is amply supported as one of the most eminent medical philosophers of the age.¶

The reputation of Willis has, however, been somewhat obscured by the still higher reputation of Sydenham, a man scarcely inferior to any that has passed under our review. He has been frequently styled the English Hippocrates, and there are various points of analogy between them, both as to general character and as to their peculiar mode of viewing the operations of the animal frame. The writings of Sydenham, like those of his great predecessor, abound in theory, but they also resemble those of Hippocrates, in containing the most accurate detail of facts, indicative of a mind of great sagacity, which enabled him to seize upon the most essential features of a disease, and to direct his attention to those points alone which tended to illustrate the nature of the morbid changes that were produced. But the great merit of Sydenham, that which has raised his reputation to so high a pitch of celebrity, and which causes his works to be still read with admiration, is the same with that which was ascribed to Hippocrates, viz. not allowing his speculative opinions respecting the nature or cause of diseases to interfere with the treatment. He carefully observed the operation of remedies on the symptoms, and

* *Enfield*, v. ii. p. 454, 5. *Sprengel*, t. v. p. 6–9. *Eloy*, in loco. *Haller*, Bib. Med. t. ii. p. 469. *Aikin's* Biog. Mem. of Med., p. 271–5. *Hutchinson's* Biog. Med., v. i. p. 303–5.

† *Sprengel*, t. v. p. 9. *Eloy*, in loco. *Campbell*, in Biog. Brit., in loco. *Aikin's* Gen. Biog., in loco. Nouv. Dict. Hist., in loco. *Aikin's* (Miss) Mem. of Charles I., v. i. p. 410–16. See "A late Discourse," &c. by Sir K. Digby, translated by R. White: a work which affords one of those embarrassing cases where it is so difficult to assign the exact limit between credulity and empiricism.

‡ Phil. Trans. for 1699, p. 332–4. *Lowthorp's* Abrid. of Phil. Trans., v. iii. p. 11, 12. *Sprengel*, t. v. p. 10. *Hutchinson's* Biog. Med., v. i. p. 373–80.

§ *Sprengel*, sect. 13, ch. i.

‖ *Eloy*, "Dubois." *Haller*, Bib. Med., lib. ix. t. ii. p. 627 et seq. *Sprengel*, sect. 13, ch. v. Biog. Univ., in loco

¶ *Barchusen*, Diss. 23, sect. 15 et seq. *Haller*, Bib. Med. sect. 685. *Eloy*, in loco. *Sprengel*, t. v. p. 72–8 *Aikin*, in loco. Biog. Univ., in loco.

the action of the various external circumstances to which the patient is exposed, and from their effect he deduced his indications. He accommodated his theory to the facts, not, as is too frequently the case, the facts to the theory. He agreed generally with Willis, in ascribing the origin of disease to certain morbid fermentations, and he conceived the primary changes to take place, not in the solids, but, according to the opinion almost universally adopted at that period, in the fluids; this, indeed, may be regarded as a necessary consequence of the assumed hypothesis.

In one important point he agreed very nearly with Hippocrates, that diseased action consists essentially in an effort of nature to remove some morbid or noxious cause, and that the great object of the practitioner is to assist in bringing about the proper crisis, and to regulate the actions of the system so as to prevent either their excess or their defect. The practice was necessarily of a kind which, in the present day, would be styled somewhat inert, consisting rather in attempts to palliate certain symptoms than in any attempt to counteract or remove their cause. But although we may conceive that the object in view was not always precisely what it would have been, had he not been somewhat biassed by his hypothesis, the mode in which he proceeded to effect his indications is in most cases very judicious. We may, perhaps, venture to affirm that there are few practitioners, even in the present day, who were better acquainted with the juvantia and lædentia, who were more successful in attaining a just medium between excessive caution and undue vigour, and whose proceedings were more guided by the dictates of a sound understanding, enlightened by an extensive range of observation and an ample store of well-digested experience.*

We have spoken of Sydenham in connection with Willis and the chemical physicians, because in many parts of his writings he adopts the hypothesis, that fermentation and other chemical changes in the state of the fluids are the primary causes of disease. Yet we have been, at the same time, especially careful to point out that the distinguishing merit of Sydenham consisted in his not manifesting an undue attachment to any theory, but in devoting himself to the study of disease, and the effect of remedies upon it. This merit was not unperceived by his contemporaries, and we learn that he was held by them in great respect. Yet the general spirit of the age was so entirely devoted to hypothesis and speculation, that he can scarcely be said to have made any great impression upon the general state of medical opinion, or to have materially diverted the mind from an almost exclusive attention to the theories which were then so prevalent. Indeed, with every feeling of admiration for the character and acquirements of Sydenham, it must be admitted that he was not himself fully aware of the great principle, which is the foundation of true philosophy as well in medicine as in every other department of science, that all theory not derived from the generalization of facts is objectionable, and almost necessarily leads to erroneous conclusions. Sydenham's natural sagacity caused him to feel the value of the inductive method, but it was more from this circumstance than from any abstract conception of its importance, that he was induced to adopt it. The state of medical science was indeed scarcely ripe for that reform which had now commenced in many other departments of philosophy. It is more a science of observation than of experiment, and the observations are of peculiarly difficult execution, depending upon the combined operation of various causes, and involving much complication in the effects, the respective proportions of which it is often extremely difficult to ascertain and to appreciate. Hence it required a more matured state of medical knowledge before we could arrive at the great truths which had been promulgated by Bacon, and which were generally recognised in the other departments of science. Although mankind were aware of the importance of observation and experience, they were not sensible of their full value; and it required another century and various successive revolutions of theory before they could be detached from the hypotheses that had been transmitted to them from their predecessors, and had been sanctioned by the authority of so many illustrious names.†

One of these revolutions was produced by the rise of a new theory of medicine, perhaps more captivating than any which had yet appeared, from its scientific aspect and its high pretensions; we allude to the doctrines of the mathematical physicians; or, as they have been termed, the iatro-mathematical School. The rapid advance which had taken place in mathematical science during the latter part of the sixteenth century, and the fortunate application of it to various branches of natural philosophy, induced some of the Italians to apply it to the explanation of the phenomena of the living system. Of these one of the first, both in order of time and of celebrity, was Borelli. He was a profound mathematician, and a man entirely devoted to scientific pursuits, and in his well-known treatise on muscular motion he illustrated, in a very happy manner, the mode in which certain functions of the body may be elucidated and explained on mechanical principles. Some of the data which he assumes are now admitted to be incorrect, and in some cases the deductions are not the fair results of the premises; but upon the whole it is allowed that he established many important points, and considerably advanced our knowledge of the animal economy. The new path of inquiry, which had been thus so successfully opened by Borelli, was soon occupied by many of his contemporaries and pupils, and according to the usual custom on such occasions, it was carried by them far beyond its legitimate limits, and was applied to various topics with which it had little connection. One of the most active and ardent in this pursuit was Bellini, who was a professor at Pisa, and who exhibited such marks of early genius as to become a lecturer at the early age of twenty. His acquirements were varied, and his talents were splendid, but they may be pronounced to be rather showy than solid, and to be more adapted to excite ap-

* *Haller*, Bib. Med. lib. 10, t. iv. p. 188 et seq. *Eloy*, in loco. *Sprengel*, t. v. p. 566-576. *Cabanis*, sect. 12. *Aikin*, in loco. *Renauldin*, in Biog. Univ.

† We have an ample account of the iatro-chemical sect in *Sprengel*, § 13. ch. vi.; its advocates were numerous and respectable, but few were of that distinction which entitles them to be noticed in this sketch.

plause than to advance true science. The mode of reasoning which had been employed by Borelli to explain the action of the muscles, which is essentially a mechanical function, and where such reasoning was therefore appropriate, was extended by Bellini to all the functions and actions of the body both in health and in disease. He maintained not only that every part of the body is under the influence of gravity and mechanical impulse, but that these are the sole agents, and that we may explain all the vital functions merely by the application of the principles of hydrostatics and hydraulics.

The imposing air of the new hypothesis instantly acquired for it a number of converts, embracing many of the most learned men of the age. The body was regarded simply as a machine composed of a certain system of tubes; and calculations were formed of their diameter, of the friction of the fluids in passing along them, of the size of the particles and the pores, the amount of retardation arising from friction and other mechanical causes, while the doctrines of derivation, revulsion, lentor, obstruction, and resolution, with others of an analogous kind, all founded upon mechanical principles, were the almost universal language of both physicians and physiologists towards the close of the seventeenth century. In proportion as the mathematical sect gained ground, that of the chemists declined, while between the two the old Galenists may be considered as nearly extinguished. In Italy and in England the mathematical doctrines had many learned and zealous adherents; it had also some followers in France, although in this country as well as in Holland and Germany, the chemical theory still continued to prevail.*

When we consider the very great influence which the iatro-mathematical sect exercised over the theories of their contemporaries, we may perhaps be surprised that it did not produce any very decided or immediate effect upon their practice. In fact their reasoning was more applicable to physiology than to medicine, for while it appeared to afford a satisfactory explanation of the phenomena of muscular contraction, of the circulation, and of the other functions in which motion was concerned, it was obviously less applicable to the explanation of the obscure and secret agencies by which diseased action is either produced or removed when present. It was, indeed, frequently employed by the pathologist to explain the proximate cause of disease and the operation of remedies, but, except in a few instances, it can scarcely be considered as having had much effect upon the actual treatment. For the most part the practice that was adopted by this sect was founded upon the principles of the humoral pathology, and may be said to have been fundamentally that of the Galenists, although with considerable additions, derived from the more energetic treatment and the enlarged materia medica of the chemists. The great advantage which the science of medicine derived from the mathematicians was of an indirect nature, depending upon the habit of close reasoning and strict deduction, which is requisite in all mathematical inquiries, and which, although in this instance incorrect in the application, and sometimes even founded upon a fallacious basis, were detailed with much labour and ingenuity, and tended both to improve the intellectual powers of the individual, and to raise the character of the medical profession.

During this period, while the minds of men were engaged in these controversies, and while so much attention was paid to theoretical reasoning, the practical part of the science was apt to be regarded as of secondary importance. Certain individuals, indeed, among whom Sydenham may be mentioned as a most illustrious example, contributed in an eminent degree to improve our knowledge of the phenomena of disease and of the effect of remedies upon it; but it must be confessed that for the most part medical men were more anxious to establish their favourite doctrines than to investigate the truth, and we find that, in the account which they give of the details of their practice, they appeared to be much more influenced by the desire of assimilating their experience to the tenets of their sect, than of inquiring how far these tenets were themselves sanctioned by their experience. In some instances there is too much reason to suspect that the operation of the theoretical views of the practitioner was decidedly unfavourable. The opinion which was entertained by the chemical physicians of the nature of fever, that it depended upon an acrid state of the fluids, led to the indiscriminate use of alkalies in all cases which were considered as belonging to this class of diseases. Again, certain hypothetical opinions which were entertained by the mathematical physicians respecting the mechanical condition of the blood, caused them to employ the lancet in cases where we should now consider it as decidedly injurious. But it does not require the illustration of particular cases to prove the position, that where the theoretical views which were entertained of the nature of the disease were incorrect, and where the practitioner was guided by these views, the result must have been frequently unfavourable. Happily, however, for mankind, there were not wanting individuals who rose superior to the spirit of the age, who disregarded the controversies of the contending sects, and who followed the inductive method of studying medicine which had now been introduced into philosophy by the commanding genius of Bacon. Besides Sydenham, our own country may justly boast of the names of Morton, Mead, and Freind,† who, although not without their bias towards particular opinions, were men of superior minds, who were fully aware of the imperfection of medical science, and of the value of experience as the means of remedying this imperfection.

CHAP. X. — *Account of the sect of Vitalists—Van Helmont—Stahl, his system—Hoffman, his system, pathology, influence of his doctrines—Solidism—Baglivi—Disciples of Stahl.*

While the medical world was thus divided be-

* *Sprengel*, sect. 14. *Cabanis*, ch. 2, § 9. In Italy we may select, as among the most eminent of the intra-mathematical sect, Borelli, Bellini, Castelli, and Guglielmini; in France we have the celebrated Sauvages, and in our own country Pitcairne, Charleton, Keill, Jurin, Mead, and Freind; we may remark, however, that some of these, although practitioners of medicine, are principally indebted for their reputation to their physiological writings.

† For the character and writings of these eminent physicians the reader is referred to the respective articles in Eloy and Haller, Bib. Med.

tween the rival opinions of the chemists and the mathematicians, a new sect was gradually rising up, which, although in its commencement it was perhaps equally remote from the principles of true science, became by successive improvements freed from many of its exceptionable parts, and finally triumphed over both the contending parties. It originated with Van Helmont, who commenced his philosophical career as a disciple of the chemical school of Paracelsus. He was a man of a powerful mind, but with a considerable mixture of enthusiasm and even of fanaticism, who became disgusted with the Galenic mode of studying and practising medicine, and embraced the bolder and more efficacious system of the chemists. But he made this great and essential addition to their doctrine,—that the changes which are produced in the body by its own spontaneous actions, as well as by the operation of remedies, are under the influence of a specific agent, which resides in or is attached to the living system, and to which he gave the name of *archeus*.*

It would not be easy to give any exact definition of the term, or to assign the precise meaning which was attached to it. Sometimes he seems to consider it as an abstract principle or power distinct from the material part of the universe; sometimes as a species of element, and at other times as a certain modification of matter which acquires peculiar qualities or agencies.† In consequence of his early training in the chemical school, he occasionally speaks of the archeus as a kind of ferment, and it would appear that he resolves all the operations of the living system and all the functions into certain fermentative processes effected by the action of the archeus. In short the archeus was the convenient and never-failing aid to which he had recourse for the purpose of explaining all the actions of the system either in health or in disease; it was equally the cause of digestion and of sanguification, of fever and of inflammation. Van Helmont, both from the peculiar turn of his mind and from the course of study to which he had devoted himself, was little qualified to watch over the phenomena of disease, or to discriminate between the nice shades which so frequently serve to characterize the different morbid affections. Accordingly it does not appear that he introduced any improvement into the practice of medicine, or indeed into any of the collateral departments; he is solely entitled to be noticed in this place as having laid the foundation for a new series of opinions, which were gradually moulded into one of the most important theories which had occupied the attention either of the physician or the physiologist.‡

Although, strictly speaking, Van Helmont must be regarded as the individual who first stated, in express terms, the great and important principle that the living body possesses powers of a specific nature different from those which belong to inanimate matter, yet so much mysticism and error were mixed with it, that it produced little effect on the opinions of his contemporaries. Nearly half a century had elapsed after his death, during which time the physicians and physiologists were still defending the doctrines of the chemists and the mathematicians each against their respective antagonists, when a new impulse was given to medical theory by the appearance of the celebrated Stahl, who was born at Anspach in the year 1660. His education was almost exclusively occupied with the study of medicine. At the age of twenty-three he became a public lecturer, and from this time he bore a conspicuous rank in his profession, both as a teacher and a practitioner, during the remainder of his life. He was brought up in the principles of the chemical school, and hence his attention was early turned to the study of chemistry, in which science he effected a still greater revolution of opinion than in that of medicine. He possessed a character and disposition well adapted to become the founder of a new sect. He had great activity of mind united to great industry; he was zealous and enthusiastic, at the same time inclined to fanaticism and mystery; he was bold, confident, and arrogant, fully impressed with the importance of his own opinions, and disposed to place little reliance on those of others. His arrogance, however, probably induced him to enter upon investigations which he might not have attempted had he contented himself with following the track of his predecessors, and to his declared contempt for the learning of his contemporaries we may consider ourselves as in part at least indebted for his original speculations, and for the actual additions which he made to our knowledge. This contempt and arrogance were carried to such an extent that he professed to set little or no value upon any of those studies that are usually associated with medicine, even that of anatomy; and he appeared to pay no regard either to the assertions or the arguments of his contemporaries when they opposed any of his favourite doctrines. Besides his ardour in the pursuit of medical science, he appears to have had a decided turn for metaphysical reasoning, and in the formation of his theories he was probably influenced by the doctrines of Descartes, which were then embraced by many of the learned men of Europe.

Stahl saw the errors and deficiencies of both the prevailing theories; he therefore laid it down as a fundamental position, that neither chemical nor mechanical reasoning is applicable to the phenomena of life, and he consequently bestowed all his attention on the study of what he termed vital actions. These actions he refers to the operation of a principle which he styles *anima*, and which in many respects resembles the archeus of Van Helmont. (Physiol. sect. 1, numb. 3, sect. 13, et alibi.) The basis of the Stahlian doctrine is similar to that of the Cartesian system, that matter is necessarily and essentially passive or inert, and that all its active properties or powers are derived from an immaterial animating principle, which is superinduced upon it or added to it. It is by the operation of this spiritual principle upon the ma-

* He probably took the term from Paracelsus, who speaks of it as a new word which he had introduced into medicine; Chirurg. Mag. tract 5, cap. 15.

† See the section of his "Ortus Medicinæ," entitled "Archeus Faber;" also *Castelli's* Lexicon, "Archeus."

‡ *Eloy*, in loco. *Haller*, Bib. Med. lib. 8, t. ii. p. 518 et seq. *Enfield*, v. ii. p. 458–60. *Goulin*, in Enc. Méth. Médecine, in loco. *Sprengel*, sect. 13, ch. 3: this author gives us a very minute analysis of the writings and opinions of Van Helmont. Although his absurdities are not concealed, we conceive that the account is somewhat too favourable. *Hutchinson's* Biog. Med. v. i. p. 414–423. *Fournier*, in Biog. Univ. in loco.

terial organs of the body that all the vital functions are produced, and it is on the absence or presence of this principle that the difference between living and dead matter essentially depends. Stahl observed with considerable acuteness the action which the mind exercises over the body, and he proved that these effects could not be referred either to a mere chemical or mechanical agent. This point, clear as it now appears to us, had not been distinctly recognised before his time, or rather, it may be said that the contrary opinion formed the basis of both the prevailing theories. But although he laid down this great truth, and established it by incontrovertible arguments, there is considerable obscurity respecting the nature of this immaterial or superintending agent; and when we enter upon the detail of his description, we become involved in a labyrinth of metaphysical subtlety. We are told that the anima superintends and directs every part of the animal economy from its first formation; that it prevents or repairs injuries, counteracts the effects of morbid causes, or tends to remove them when actually present, yet that we are unconscious of its existence; and that, while it manifests every attribute of reason and design, it is devoid of these qualities, and is in fact a necessary and unintelligent agent. He examined with much attention the nature of the different functions, their relation to the anima, and their dependence upon it; he endeavoured to explain the effect of organization, and the mode in which organization operates in producing these functions. In these investigations he displays considerable acuteness, and he contributed materially to advance our knowledge of the laws of vitality; but still his ideas are, in many respects, confused and indistinct, and he is more disposed to enter into subtile disquisitions respecting the nature of his supposed principle, than to examine the actual phenomena of the animal economy, and from them to deduce his general laws.*

Contrary to what is frequently the case, the hypothesis of Stahl had a considerable influence upon his practice. As all the actions of the system are under the control of the anima, and as the office of this principle is to preserve the system in its perfect state, the duty of the physician is reduced to the mere superintendence of its actions, generally to co-operate with its efforts, or if they should be irregular or injurious, which we are to suppose is seldom the case, to endeavour to restrain or counteract them. These views tended to repress the energy of the practitioner still more than the pathological doctrines of Hippocrates, inasmuch as the anima of Stahl was conceived to exercise a more direct influence over the operations of the economy than the φυσις of Hippocrates, which was simply a general expression of these actions, and which, according to circumstances, might be either beneficial or injurious to the system. As a specimen of the mode in which Stahl applied his theory to practice, we may select his doctrine respecting plethora. He supposed that the body had a general tendency to the plethoric state, because he observed that spontaneous evacuations of various kinds occasionally took place, and these he assumed were produced by the provident care of the anima, in order to remove a plethora which must have previously existed so as to render them necessary. An important office of the superintendent principle is therefore to produce the necessary evacuations in order to prevent or remove this plethora, and hence it becomes the duty of the practitioner to watch over the evacuations, to promote them if too scanty, or to repress them if too abundant. (Pathol. pars ii. sect. 1, mem. 2, § 3 et alibi.)

The theory of Stahl, so far as it tended to fix the attention upon the vital actions of the system, and to overthrow the mechanical hypotheses which had so long and so generally prevailed, may be considered as having performed an essential service to the science of medicine. The appearance of metaphysical acuteness which it presented, independent of its real merits, acquired for it a degree of popularity in an age when the attention had been particularly directed to subjects of this description. It certainly produced a considerable revolution both in medical language and in medical opinions; and although Stahl had but few followers who received his doctrines in their full extent, it was partially embraced by many of the most intelligent and learned men of that period, and it has ultimately had a great and extensive influence on the state of the science. Independently of the defects inherent in the system itself, the spirit of inquiry was now so widely diffused, and the importance of patiently investigating the phenomena of the animal economy was so generally admitted, that the merits of all theories were more strictly canvassed and subjected to more severe examination. From the same combination of causes a variety of rival hypotheses were produced, which tended to prevent the exclusive adoption of any one of them in preference to the rest; and the same state of things was still farther promoted by the great number of medical schools which were established in all the great cities of Europe, each of which was anxious to advance its claim to the public attention.

We have given to Stahl the great merit of having clearly perceived and decisively established the important truth, that the operations of the animal economy cannot be explained by the laws either of chemistry or of mechanics, and that we must therefore have recourse to something of a specific nature, peculiar to the living system itself. Yet, although he succeeded in pointing out the insufficiency of the existing theories, the one which he substituted in their place, the action of the superintending anima, was no less difficult to comprehend, was equally hypothetical, and equally liable to objections. His genius was not of a kind which was adapted to slow and patient investigation, and we accordingly find that he either defends his system upon general grounds, or rests satisfied with merely pointing out the errors and deficiencies of his adversaries. A powerful and sagacious mind was still wanting, which might carefully examine into the nature and operations of the powers that exclusively belong to the living body, and after ascertaining the facts, might generalize them, and thus deduce the correct theory. This was a process of much labour and difficulty,

* *Haller*, Bib. Med. lib. xi. t. iii. p 575 et seq. *Eloy*, in loco. *Cullen*, Preface to his "First Lines," p. 12-18. *Sprengel*, sect. 15, ch. 1, t. v. p. 195-270. *Blumenbach*, § 120. *Thomson's* Cullen, v. 1. p. 164-182. *Renauldin*, Biog. Univ. in loco.

one which could only be accomplished by slow degrees, and which it might be expected would require the co-operation of various individuals.

Of those whom we should be disposed to regard as having mainly contributed to this gradual progression, the first in point of time as well as of celebrity is Hoffmann. He was the contemporary of Stahl, and his colleague in the university of Halle; he may be considered likewise as his rival, for although they both contributed so considerably to advance our knowledge of the animal economy, and, to a certain extent, by pursuing a similar mode of reasoning, yet they were persons of very different habits and dispositions, and attempted to attain the same object by very different means. Hoffmann was a prolix and discursive writer, whose collected works occupy many folio volumes, and the very titles of which, as detailed by Haller, extend to no less than thirty-eight quarto pages. (*Haller*, Bib. Med. t. iii. p. 536-576.) It must therefore be supposed that they contain much that is of little value, and exhibit many marks of the hasty manner in which they were composed. Yet he appears to have been a diligent observer and collector of facts, and therefore, notwithstanding the repulsive aspect of his works, they are highly estimated and frequently referred to. He attended much more to the details of practice than his colleague, and, indeed, the basis of his great work, "Systema Medicinæ Rationalis," is essentially practical, in which his physiological and pathological doctrines are, for the most part, introduced in an incidental manner, as supporting or elucidating his practical observations. Of the nature or details of his practice it will not be necessary to enter into any minute examination. It did not differ very materially from that of his contemporaries, although the circumstance of his being less exclusively attached to any single hypothesis has rendered him more disposed to take a candid and unprejudiced view of the various points which would necessarily fall under his observation. In his leading doctrines he must be classed with the mathematical physicians, but at the same time he adopts many of the opinions of the chemists, and indeed not unfrequently derives his indications from the supposed chemical condition of the fluids. But the great and important addition which Hoffmann made to theory, both medical and physiological, is the distinct manner in which he refers to the operations of the nervous system, and its influence on the phenomena of life. Many of the actions which Stahl ascribes to the action of his hypothetical principle, the anima, Hoffmann explained by referring them to the nervous influence, a physical power no less real than that of gravity or chemical affinity, but of a specific nature and operating by its own laws, the knowledge of which is to be acquired by observation and experiment. (*Thomson's* Cullen, p. 195, 6.)

But whatever merit Hoffmann may have had as a practitioner, his reputation with posterity must principally rest upon his merit as a pathologist. Although, as we have stated above, he considered the fluids to be occasionally the primary seat of disease, yet in most cases he conceives it to originate in an affection of the solids. In order to explain this affection, he assumed that what he terms the moving fibre possesses a certain degree of action or tone, which constitutes its natural state, and is necessary for the performance of its functions. Various circumstances, as well external as internal, were supposed either to increase or diminish this tone; if it were increased beyond its due limit, the state of spasm is the result; if it were unduly diminished, the contrary state of atony was produced. This celebrated theory, which under various modifications entered so largely into the speculations of most of the pathologists of the seventeenth century, cannot be maintained in all its parts as it was detailed by Hoffmann; it must, however, be admitted that it made a considerable approach to a correct view of the subject, and that it may be regarded as the germ from which the more mature doctrines of his successors immediately emanated. It has been supposed that he borrowed it from the constricted and relaxed fibre of the ancients, but even if we admit that this may have furnished him with the first hint, it was so far new-modelled and extended by him as to deserve the merit of originality.*

This hypothesis of the nature of the moving fibre, together with the more extensive influence which the nervous system was imagined to exercise over the various operations of the animal economy, may be considered as forming the basis of both the physiology and the pathology of Hoffmann. Unfortunately for the fame of this writer, in consequence of the multiplicity of his works, and the hasty manner in which they were composed, it is very difficult to obtain a consistent or connected view of his theory; but, upon the whole, we conceive that he is entitled to the merit of having materially advanced our knowledge of the laws of the animal economy, and still more, of having pointed out the track which might be successfully pursued by others for the farther advancement of this knowledge. With respect to the works of Hoffmann it may be further remarked, that as in the course of his experience he gradually enlarged and corrected his pathological doctrines, and continued to publish them from time to time, in detached portions, but without giving them in a condensed or abstracted form, we frequently meet with what appear to be inconsistencies and contradictions, and are obliged to collect his opinions rather from inferences and from indirect remarks, than from any clear and explicit statement of them.†

In giving an account of the pathology of Hoffmann, we have somewhat anticipated an important point of medical theory, to which we must now revert. We have had occasion in various

* Cullen, in the preface to his "First Lines," bears ample testimony to the value and importance of Hoffmann's physiological speculations, and acknowledges the use which he had made of them in the formation of his own hypotheses.

† *Haller*, Bibl. Med. lib. x. sec. 877, t. iv. p. 536 et seq. Nouv. Dict. Hist. in loco. *Eloy*, in loco. *Cullen*, preface to his "First Lines," p. 18-25. *Sprengel*, sect. 15, ch. 2. *Blumenbach*, sect. 419. *Goulin*, in Enc. Meth. Médecine, in loco. *Thomson's* Life of Cullen, v. i. p. 182-200. Biog. Univ. in loco. Of his works the following may be selected as the most original and valuable:—Systema Medicinæ Rationalis; Medicina Consultatoria; Opuscula Med. Phys.; Consult. et Respons. Cent.; Pathologia Generalis; Therapia Generalis; Semeiologia; Philosophia Corporis hum. vivi.

parts of this history to notice, that through all the succession of opinions from the time of Hippocrates to the period at which we are now arrived, with a very few exceptions, the hypotheses were all founded upon the humoral pathology. This opinion was maintained equally by the mathematicians, the chemists, and the metaphysicians. The changes that were produced in the system, whether mechanical or chemical, were equally supposed to take their origin from the fluids, while the metaphysician imagined that it was upon the fluids that his immaterial superintending principle exercised its action. We may regard the publication of Glisson's treatise, "De Ventriculo et Intestinis," which appeared in 1671, as having laid the foundation for the change of opinion which afterwards took place respecting this doctrine. It was in this work that the hypothesis of muscular irritability was originally brought forwards, a specific property, which is supposed to be attached to the living fibre, and from which is deduced its peculiar power of contraction.* But the first writer who systematically opposed the theory of the humoral pathology was Baglivi. He was born near the conclusion of the seventeenth century, and after rising to early eminence in his profession, and acquiring a high reputation for his sagacity in the treatment of disease, and for the assiduity which he displayed in the acquisition of medical knowledge, was prematurely cut off at the age of thirty-four. (*Eloy*, in loco. *Haller*, Bibl. Med. lib. xii. sec. 954, t. iv. p. 197 et seq. *Goulin*, in Encyc. Méth. Médecine, in loco. *Chaussier et Adelon*, in Biog. Univ., in loco.) He proceeded upon the Hippocratean plan of watching attentively and accurately describing the phenomena of disease; but he differed from him as to their primary seat, rejecting the principles of the humoral pathology, and placing the causes of them in the altered condition of the solids. His account of the nature of the solids, and the actions of what he terms the moving fibres, is by no means conformable to our modern notions on the subject, and may be pronounced to be incorrect; but the opinion that the fluids are affected secondarily, in consequence of a previous affection of the solids, was a great and important point of theory, which has been gradually gaining ground since the time that it was first promulgated by Baglivi, and may be regarded, with certain modifications, as the current hypothesis of the present day. The doctrine of solidism had, indeed, no direct or immediate effect upon the practice of medicine, but by drawing the attention more to the state of the muscular and nervous systems than to that of the fluids, it tended to correct many of the erroneous opinions which had previously prevailed respecting the actual condition of the system when labouring under disease, and in this way powerfully contributed to improve our knowledge of the relative state of the different parts of the animal economy, and of the operation of remedies upon it. The gradual subversion of the humoral pathology may also be regarded as a remote cause of the favourable reception with which the doctrines of Hoffmann were received, while the attention which he paid to the action of the nervous system contributed, in its turn, still farther to favour the theory of solidism in opposition to that of the humoral pathology.

The theory of Stahl, notwithstanding its defects and inconsistencies, was calculated to make a considerable impression upon the public mind at the time when it was advanced, and it accordingly met with numerous supporters. It clearly pointed out the inadequacy of all the previous hypotheses, founded merely on mechanical principles, to explain the phenomena of vitality, while it was powerfully recommended by its simplicity; and perhaps even its metaphysical aspect might render it not the less acceptable to his countrymen, who were deeply interested in the speculations of Leibnitz, and the controversy to which they had given rise. It was not, indeed, generally embraced in its full extent; but with certain modifications it remained the favourite doctrine with many of the Germans, until it was gradually superseded by the more correct views of Hoffmann, and still further by the powerful and commanding genius of Haller.

Of the followers of Stahl, who adopted his opinions with the fewest alterations, we may select the names of Juncker and Alberti, who were both of them professors in the university of Halle, of which they contributed for many years to support the reputation which it had acquired under their illustrious predecessors. They were both of them voluminous writers, and they devoted a considerable part of their labours to expounding and illustrating the principles of the Stahlian system. But their works being more theoretical than practical, and being intended rather for the purpose of defending certain opinions than for the acquisition of knowledge, are now sunk into oblivion, or are merely referred to as historical records of an hypothesis which formerly engaged so much attention.

With these remarks on the theory of the vitalists we shall close the review of the state of medical science during the seventeenth century. Up to this period we have adopted the chronological arrangement, and by pursuing this method have been enabled without difficulty to trace the successive stages of the progress of our art. But, as we approach nearer to our own times, the number of subjects which claim our notice are so multiplied, that it will be necessary to continue the historical sketch upon a different plan. Disregarding therefore, to a certain extent, the mere order of time, we shall, in succession, give an account of those individuals who have acquired the greatest degree of celebrity, endeavouring at the same time to class them according to the opinions which they adopted, pointing out their connection with each other, and with the general state of medical science.†

* See especially the fifth chapter of the treatise entitled "De fibris in genere." *Eloy*, in loco.

† It may be necessary to observe that we have already somewhat deviated from the chronological arrangement in considering Hoffman and Stahl as belonging to the seventeenth century, although it was not until near the close of it, in the years 1693 and 1694, that they entered upon their office as professors at Halle. But by admitting of this irregularity, we have made the division to correspond more nearly with the changes which took place in the state of medical science.

CHAPTER XI.—*Introductory remarks—General progress of medical science—Boerhaave, character of his writings, his pathology—Gaubius—Gorter—Haller, his character, pathological doctrines, his disciples, his opponents—Whytt—Semi-animists—Sauvages—Cullen, his pathology and practice, his pupils—Brown, his system—Darwin, his system.*

From the revival of letters to the commencement of the eighteenth century, including a period of between two and three hundred years, the great aim and object had been to apply to medicine the same scientific principles which had been found successful in the advancement of the other departments of philosophy. The most distinguished medical writers of that period had therefore employed themselves rather in collecting opinions and in reasoning upon them, than in examining into the grounds on which these opinions had been formed, or inquiring in what degree they were applicable to the explanation of the phenomena of the animal economy. For the most part, as we have had occasion to remark, they failed in their direct object; at the same time, however, a considerable body of information was gradually acquired, and the views which now began to be unfolded in consequence of the pathological speculations of Hoffmann, and the practical observations of Sydenham and the modern Hippocrateans, led to the establishment of the same spirit of inductive investigation in medicine which had been for some time adopted in the other departments of natural science. We have passed over the age of mere learning, and we now enter upon that of observation and experiment. Scholastic disquisitions were completely disregarded, abstract theory was rapidly falling into disrepute, and hypotheses were no longer considered as deserving of attention unless they professed to be derived from the generalization of facts. The necessary result of this state of things has been to detach the mind from the arbitrary influence of theory, to diminish the authority of great names, and to induce the inquirers after truth to rest more upon their own exertions than upon the authority of others. We have, indeed, still to lament the errors and perversions of the human mind, to witness the attempts of ignorance and arrogance to usurp the place which is due to modest desert and patient research; but such attempts for the most part have obtained only temporary success, and after an ephemeral celebrity have been consigned to their merited contempt. In the mean time, notwithstanding these occasional interruptions, the progress of knowledge has been rapidly and steadily advancing. Experiments, well contrived and patiently conducted, have been performed in every department of physiological and medical science; observations have been made with more minuteness, and recorded with more accuracy; our improved knowledge of chemistry has enabled us to introduce the most important reforms into pharmacy, while the discovery of various new articles of the materia medica has given us additional and powerful means of opposing the progress of disease.

While Stahl and Hoffmann were promulgating their doctrines in the university of Halle, the celebrated Boerhaave was teaching medicine with equal zeal, and we may venture to say with more success, at Leyden.* Boerhaave was originally educated for the profession of theology, but owing to some doctrinal scruples he fortunately relinquished his intention, and devoted himself to the study of medicine in all its branches. There are few examples, either in ancient or in modern times, of any individual who arrived at higher eminence, both in general knowledge and in the departments more immediately connected with his profession. His acquaintance with botany and with chemistry were such as to enable him to teach both these sciences with the greatest success; while his lectures and his writings on medicine, both theoretical and practical, were long considered as standards of excellence. He had a mind and character peculiarly well adapted for his situation and the age in which he lived, when a variety of new facts and new hypotheses were brought into view, and when it required a consummate degree of judgment to weigh the opposing evidence, and decide between the merits of the contending parties. His moral qualities were no less admirable than his intellectual acquirements; and if we add to these his elegance as a writer, his eloquence as a lecturer, and his entire devotedness to his profession, we shall be at no loss to account for the celebrity which he enjoyed during his lifetime, and the reputation which he left behind him.

Boerhaave has been compared to Galen, and it may be asserted that he will not lose by the comparison. If Galen possessed more genius, Boerhaave possessed more judgment; while in their scientific acquirements, and in the extent of their information, it would not be easy to decide between them. They were both eminently skilled in the art of availing themselves of the knowledge of their contemporaries in all the branches of science, of applying it to the elucidation of their particular department, and of modelling and combining into a well-digested system all the scattered materials which they obtained from so great a variety of sources. In the stability of their systems, however, we observe a remarkable difference, for while Galen's doctrines were implicitly adopted for many centuries, the system of Boerhaave, notwithstanding its real merits and the applause which it obtained during the life of its inventor, shortly after his death was assailed from numerous quarters, and was unable to maintain its ground. The age in which Boerhaave lived was not one of authority but of investigation, and the enlightened spirit which pervades his own works tended in no small degree to foster that taste for inquiry which led his contemporaries not to rest satisfied with his theories, however beautiful might be their aspect, and however happily they might appear to explain the phenomena of life, if they were found to be based upon principles which were themselves conjectural and gratuitous.

The great object of Boerhaave in the formation of his system was to collect all that was valuable from preceding writers, and by means of these materials to erect a system which should be truly eclectic. The basis of his doctrines is in a great measure mechanical, derived from the hypothesis

* Boerhaave was elected to the chair of medicine in 1709.

of Bellini and Pitcairne, but he unites with this certain parts of the humoral pathology, and adopts some of the opinions of Hoffmann. To these he added various original observations, by which he has given ample proof of his talents as a sagacious practitioner. His language is remarkably perspicuous, and his reasoning, if we admit his premises, is fair and conclusive. But the grand error of Boerhaave consisted in his depending more upon opinions than upon observations, in his endeavouring to form a system which should be composed of the united speculations of others, rather than to ascertain the correctness of the principles from which these speculations were deduced. His system accordingly met with the fate of all such as are built upon hypothesis; it could not stand the test of experiment and observation, and notwithstanding the efforts of some of Boerhaave's pupils, who were zealously attached to their master, it was generally discarded in no long period after the death of its inventor. But although the system of Boerhaave may have yielded to the more perfect and enlarged theories of his successors, he must be ever regarded as one to whom the science of medicine is deeply indebted. His Institutions and his Aphorisms would alone serve to immortalize his reputation as a correct observer and a sagacious practitioner, and if we compare them with any contemporary performance, which is the fair method of judging of the merits of works of science, we cannot fail to recognise their great superiority.*

In forming his system, Boerhaave was not unmindful of the doctrines of Hoffmann, and particularly of the influence which the brain and nerves exercise over the operations of the animal economy. But although he introduces it on certain occasions, and in some instances allows it to act a prominent part,† yet he was by no means fully aware of the extent of its power. This indeed may be considered as the radical defect of his pathological doctrines; he regards the solids too much in the light of mere mechanical agents, without sufficiently taking into account those properties which specifically distinguish them from inanimate bodies. This deficiency was to a certain extent supplied by his nephew Kauw Boerhaave, (*Thomson's* Cullen, v. i. p. 219,) and by his favourite pupil and successor Gaubius, (Ib. p. 220,) who introduced the agency of the nervous system in many cases where it had been omitted by Boerhaave himself. They were both of them men of considerable talents and acquirements, and the improvements which they made in medical theory were of real value. The writings of Gaubius, especially his Nosology and his Institutions of Pathology, were long held in high estimation, and were employed as text books in the medical schools. (*Haller*, Bibl. Anat. t. ii. p. 166, 7. *Eloy*, in loco. *Aikin's* Gen. Biog. in loco. *Thomson's* Cullen, v. i. p. 220, 1. *Desgenettes*, in Biog. Univ. in loco.) In the same connection we may mention the name of Gorter, an eminent professor and practitioner at Harderwyc, who, while, like Boerhaave, he adopted the essential parts of the mechanical theories of his predecessors, made considerable use of the agency of what he termed the vital force in explaining many of the operations of the animal economy. (*Eloy*, in loco *Haller*, Bibl. Anat. t. ii. p. 169, 70. *Sprengel*, t. v. p. 314–16. *Thomson's* Cullen, v. i. p. 218. *Renauldin*, in Biog. Univ. in loco.) The writings of Gorter are very numerous, and prove him to have been an industrious cultivator of medical science, while his great practical work, entitled "Compendium Medicinæ," indicates a talent for correct observation, and an accurate discrimination of morbid symptoms.

But the great support and ornament of the Boerhaavian school was Van Swieten. He was born at Leyden in the last year of the seventeenth century, and was one of the most favoured and meritorious of the pupils of Boerhaave. In consequence of his theological opinions not coinciding with those of the state religion, he was expelled from the university of his native city, in which he held a professorship, and accepted an invitation from Maria Theresa to the court of Vienna. Here honours and distinctions of all kinds were heaped upon him; but these he amply repaid by the unremitting attention with which he devoted himself to the medical school of that metropolis. Of the high reputation which it has since enjoyed he may be said to have laid the foundation, while by the publication of his Commentaries on the Aphorisms of Boerhaave, he demonstrated at the same time the high respect which he retained for his preceptor, and the extent of his own information on all subjects connected with medical science. The Commentaries of Van Swieten contain a large and valuable collection of practical observations, partly the result of the author's own experience, and partly derived from his extensive knowledge of books. He adopted the theory of Boerhaave with little alteration, and in this respect the work must be regarded as fundamentally defective; but the great body of facts which it contains, detailed as they are in a clear and perspicuous style, will always insure it a place in the library of the medical student. (*Eloy*, in loco. *Nauche*, in Biog. Univ. in loco.)

The intimate connection which subsists between the doctrines of pathology and an acquaintance with the laws of the animal economy in its healthy and perfect state, makes it necessary for us to give some account of an individual who, although not a practitioner of medicine, contributed perhaps more to our knowledge of the nature of disease than any one who has hitherto passed under our review. We refer to the great name of Haller, who has been not unaptly termed the father of modern physiology. He was the pupil of Boerhaave, and imbibed from him his thirst for knowledge, his correct judgment, his undeviating candour, his unblemished integrity, and in short all the intellectual and moral qualities which we have admired in the professor of Leyden. But to these qualities Haller added a more extensive and original genius, which led him never to rest upon the unexamined opinions of others, and a clearness of conception which taught him, both in

* *Haller*. Bib. Med. lib. xii. t. iv. p. 142 et seq. *Eloy*, in loco. *Cullen*, Preface to his "First Lines," p. 25–35. *Hutchinson's* Biog. Med. v. i. p. 82 et seq. Nouv. Dict. Hist. in loco. *Thomson's* Life of Cullen, v. i. p. 200–17. *Blumenbach*, Introd. § 418. *Goulin*, in Encyc. Meth. Médecine, in loco. Biographie Universelle in loco.

† See particularly his work entitled "Prælectiones de Morbis Nervorum."

his language and his mode of reasoning, to avoid all ambiguous and undefined terms, and all irrelevant arguments. He possessed a mind at the same time comprehensive and correct, equally adapted for discovering new paths to knowledge, and for investigating those which had been previously entered upon by others. The innate powers of the components of the body, which had been imperfectly seen by Glisson and by Hoffmann, were examined by Haller with his characteristic acuteness, and the result of his long and well-directed experimental research was rewarded by the establishment of his theory of irritability and sensibility as specific properties attached to the two great systems of the animal frame, the muscular and the nervous, to which, either separately or conjointly, may be referred all the phenomena of the living body. But perhaps a still more important service which Haller rendered to science was the example which he held out of carefully abstaining from all opinions founded merely upon speculative grounds, and of deducing his general principles exclusively from experiment and observation. He gave an impulse to science no less by the actual discoveries which he made, than by the spirit with which he conducted his researches, so that we may regard the publication of his Elements of Physiology, as having introduced a new era into medical science.*

It would be incompatible both with the immediate subject of this essay, and with the limits to which it is necessarily restricted, to give a detailed account of the controversies and discussions to which the theory of Haller gave rise. Notwithstanding its merits, and the evidence by which it was supported, it was opposed, either in its full extent or in certain of its parts, by many individuals of high respectability; while on the contrary various experiments were instituted, by which his conclusions were confirmed and his principles extended. Among those who were the most successful in these researches we may select the names of Zimmermann, (De Irritabilitate,) Caldani, (Instit. Physiol.) Fontana, (in *Haller*, sur la Nature Sens. et Irrit. t. iii.) Tissot, (Ibid. t. i. et iii.) Zinn, (Exper. circa Corp. Cal. etc.) and Verschuir. The last of these physiologists particularly distinguished himself by his experiments on the contractility of the arteries, (De Arter. et Ven. Vi. Irrit.) a point which had been left undecided by Haller, but which formed a most important addition to the theory of the action of the vessels, and which had previously been rather assumed as what was probable than deduced from any ascertained facts.

Among the most powerful opponents of the doctrine of Haller we may select the names of Whytt and Porterfield. They were natives of Scotland, and during the earlier part of the last century were residents in the metropolis of that kingdom, and bore a conspicuous part in the scientific institutions for which it was so justly celebrated. The former of them was professor of medicine in the university of Edinburgh at the time when it was rapidly advancing to that high reputation which it afterwards more fully attained under the genius of his illustrious successor Cullen. They opposed that part of the theory of Haller which ascribes all the actions of the living system to certain powers necessarily connected with the material parts of the frame, as well as to the separation of these actions into the two distinct powers of irritability and sensibility.† The controversy which Whytt carried on with Haller was conducted with acuteness and ability, but it manifests a degree of acrimony which it is impossible not to regret, particularly as occurring in an individual who was otherwise so much entitled to our respect. And this is more especially the case when we consider the nature of the objections which he urged against the Hallerian hypothesis, which were rather of a metaphysical nature than such as were either founded upon experiment or deduced from observation. His doctrine of the vital motions of the body, which formed the principal subject of the controversy, may be regarded as intermediate between that of Haller and Stahl, or rather compounded of the two. He attributes these vital motions to the operation of the sentient principle, which is supposed to be something distinct from the corporeal frame, at the same time that it is necessarily attached to it, and is under the influence of physical causes, not like the anima of Stahl, acting by a species of independent consciousness and volition. The great error which pervades the speculations of Whytt and Porterfield consists in their reasoning more upon metaphysical than upon physical principles, and in their assuming certain powers, the proof of which rests more upon their supposed necessity to account for the actions of the system than upon any independent evidence that we have of their existence. They did not indeed, like the Stahlians, consider the sentient principle as something independent of the body, and only as it were appended to it, but as a principle or power necessarily belonging to the living body, and imparting to it its vitality, although essentially distinct in its nature from any of the properties of a mere material agent. Whytt may be regarded as the founder of the sect which obtained the name of the semi-animists, which, under various modifications, included some of the most distinguished physiologists both in this country and in France. Of the latter, one of the most eminent was Sauvages; he was a native of Languedoc, and received his education at Montpellier, which, during the early part of the eighteenth century, held a very high character as a school of medicine. In 1734 he was appointed one of the professors in the university of that city, and during the remainder of his life contributed materially to maintain its credit by his talents both as a writer and a teacher. His reputation with posterity will principally rest upon his methodical nosology, a work which contains an arrangement of diseases into classes, orders, genera, and species, on the same plan which had been employed in the arrangement of the subjects of natural history. The Nosology of Sauvages is a work of great and original merit, which,

* *Elye*, in Mém. Acad. Scien. 1777. *Henry's* Life of Haller. *Sprengel*, sect. 15, ch. iii. *Aikin's* Gen. Biog. in loco. *Thomson's* Cullen, v. i. p. 221-240. *Cuvier*, in Biographie Universelle, in loco. *Dewar*, in Brewster's Encyc. art. "Haller." *Blumenbach*, Introd. § 468. *Goulin*, in Enc. Méth. Médecine, in loco.

† See particularly *Whytt* on Vital and Involuntary Motions, and Physiological Essays. *Porterfield* on the Eye, passim, and papers in Edinburgh Medical Essays. *Thomson's* Cullen, v. i. p. 241-253.

although now in some degree superseded by the improvements of later writers, mainly contributed to the advancement of medical knowledge by producing accuracy in the use of terms and in the discrimination of the characters of disease. (*Eloy*, in loco. *Haller*, Bibl. Anat. "Boissier," t. ii. p. 300–4, § 999.)

The same kind of service which Haller rendered to the science of physiology was performed for that of the practice of medicine by his contemporary Cullen. Among those who have made the study of medicine their professed pursuit, no one, since the revival of letters, has risen to greater eminence during his life-time, nor has left behind him a higher reputation than this celebrated individual. During the greatest part of a long life, he was engaged in the teaching of medicine or some of the collateral sciences, first in the university of Glasgow, and afterwards in that of Edinburgh, which latter he contributed, in no small degree, to raise to the rank, which it long held, of the first medical school in Europe. His peculiar excellence as a lecturer afforded him an ample opportunity of promulgating and enforcing his doctrines, while their real merit, no less than the mode in which they were announced, rendered them in the highest degree popular among his pupils and contemporaries. He possessed an acute and ardent mind; he was well skilled in the medical literature both of the ancients and the moderns, but he had no undue respect for the opinions of others on the mere ground of authority. He detected the defects of former hypotheses with shrewdness and sagacity, while he proposed his own views with a degree of candour and modesty which tended to render them the more acceptable, and disposed his audience to receive them in the same spirit with which they were proposed.

With respect to his physiological writings, they afford, in some respects, a remarkable contrast to those of Haller; for while the latter are extended to a great length, and are filled with the most minute and elaborate details, the former are no less remarkable for their compressed brevity, consisting principally in general views and abstracted deductions. Contrary, however, to what is so frequently the case with respect to works of this description, they are not to be regarded as mere speculative positions, but as the condensed result of patient research and extensive observation. Some of the leading doctrines of his pathology were professedly borrowed from Hoffmann; but to these he made many important additions by taking advantage of the various improvements that had been made in physiological knowledge, principally by means of Haller and his pupils. Still later discoveries in this science, and in that of chemistry, have indeed proved that certain parts of his system are not tenable, and that others require to be considerably altered and modified; but it may be asserted that no one produced a more powerful and lasting effect upon the state of medicine in all its branches, both theoretical and practical, than Cullen. But his great and appropriate merit, and which entitles him to the admiration and gratitude of posterity, is the sagacity and diligence which he manifested in the description and discrimination of the phenomena of disease. In this talent he may be considered as rivalling Sydenham or any of his most distinguished predecessors, while the recent improvements in physiology and the other branches of medical science gave him an advantage which he did not fail duly to improve. In his treatment of disease he manifested no less judgment and sagacity than in the formation of his theories. He was prompt and decisive, without rashness; he estimated the powers of remedies by a cautious and accurate examination of their effects, with little bias from hypothesis, and with even somewhat of a sceptical disposition of mind, which prevented him from falling into those errors and inconsistencies to which the practice of medicine is so peculiarly obnoxious.

In giving an account of the system of Boerhaave we remarked that in its formation he proceeded upon the eclectic plan, founding it upon the opinions of others, which he endeavoured to connect together and to mould into a consistent and uniform theory. Cullen adopted the more philosophical mode of generalization and induction. He disclaims all hypotheses and theories not immediately derived from facts, and made it his great business to collect, by actual observation, the materials from which he might deduce his general principles. In this object he was eminently successful, and it is this which gives his writings their great value, a value which they must ever retain amidst all the revolutions of opinion, which attach to medicine more than to any other branch of science. But, although he was so sensible of the advantage of the inductive mode of investigation, he was not a mere empirical practitioner, who disregarded all theoretical reasoning, and never ventured to go beyond the simple result of experience. On the contrary, he inquires in all cases into the remote and primary causes of disease, and endeavours to deduce from them his indications of cure. Many of his individual speculations are indeed remarkable for their subtilty and refinement, and may be characterized as exhibiting more ingenuity than judgment. At the same time it is not a little remarkable that these speculations, however carefully they were elaborated, had but little influence on his practice; and it is gratifying to observe with what caution he applies his hypotheses to explain or direct his method of treating disease.

His great work, entitled "First Lines of the Practice of Physic," is the one on which his reputation will principally rest; but the merits of his Institutions, of his Nosology, and of his Lectures on the Materia Medica, are each of them sufficient to have entitled him to a distinguished rank among the improvers of medical science. The last of these works, in which he takes a more philosophical view of the operation of remedies than had been done by any of his predecessors, is one of peculiar value. It contains a great variety of important pathological observations, together with a complete theory of therapeutics, and being the latest of his publications, we find in it his more matured and corrected views on many topics which had been treated in his former works. In none of them do we find more of that spirit of rational scepticism to which we have alluded above, and which led him to be more confident in opposing the opinions of others than in maintain-

ing his own. Like Haller, with whom we have already taken occasion both to compare and to contrast him, he contributed to introduce into medical reasoning a philosophical spirit, which has produced a permanent and highly salutary effect upon the healing art, and which associates the name of Cullen with those of the great benefactors of the human race.

It is not easy to give, in a short compass, an account of the pathological doctrines of Cullen, because they consisted rather of a number of individual parts, as applied to the explanation of particular phenomena, than of one comprehensive system, which constituted a general theory of diseased action. The foundation of the system is, however, sufficiently simple; that the living body consists of a number of organs, which are all of them possessed of powers of a specific and appropriate nature, distinct from those which are attached to inanimate matter. These powers are so ordered, that they have a tendency to preserve the whole machine in a perfect state, when its actions and functions proceed in their ordinary course. When any irregularity supervenes, either from internal or external causes, if it be not in an excessive degree, the self-regulating principle is sufficient to control the operation of the morbid cause, and to restore the system to its healthy condition. This regulating principle, or, as it was termed, the *vis medicatrix naturæ*, differs essentially from the archeus of Van Helmont or the anima of Stahl, inasmuch as it is supposed not to be any thing superadded to the body, but one of the powers or properties necessary to its constitution as a living system, and the existence of which is recognised by its effects. Although the laws of gravity and of chemical affinity affect the animal body, so far as it is composed of material organs, yet its appropriate actions are under the immediate influence of the specific laws of vitality. Hence all explanations, depending upon mere mechanical or chemical reasoning, were abandoned, and in their place was substituted the vital action of the parts, and more especially that of the extreme branches of the arterial system, or, as they are styled, the capillary arteries. Although it may appear that both Stahl and Hoffmann had to a certain extent preoccupied the ground which was taken by Cullen, as to the foundation of his system, and although the system, as detailed by him, is defective in some of its subordinate parts, yet we must admit that the ample and explicit manner in which it was stated gave it the aspect and much of the merit of novelty, while the applications which he made of it were frequently just, and always ingenious. His physiology and his chemistry were not in all cases correct; he did not pay sufficient attention to the distinction between the powers of the muscles and the nerves, which had been so well discriminated by Haller, and he even confounds their physical structure. But with all these abatements we still regard the pathology of Cullen with much respect, and consider him as one of those who greatly contributed to improve the science no less than the practice of his art.*

What may be termed the Cullenean school of medicine, including both his numerous pupils and the writers who either embraced his peculiar opinions, or adopted his method of investigation, comprehends a large proportion of the most distinguished of the British physicians during the remainder of the eighteenth century. The rational empiricism, as it has been styled, which he so firmly established, both by precept and example, has, in this country at least, so far superseded the taste for mere speculation and hypothesis, that we are perhaps disposed to run into the opposite extreme, and to undervalue all attempts to investigate the abstract principles of pathology, and to employ ourselves solely in the accumulation of facts, without duly attending to the general conclusions that may be deduced from them.†

We have, however, to notice one singular exception to this remark, where an hypothesis was advanced, of the most bold and lofty pretensions, disdaining the support of facts and experience, and professing to explain all the phenomena of life and of disease by a few simple aphorisms. In tracing the history of science, although it is proper for the most part to estimate books and opinions solely by their intrinsic merit, without any regard to the personal character of the author, yet we find them on some occasions so intimately connected that it is impossible altogether to separate them. This is the case with the celebrated Brown, whose theory appears to have originated as much from spleen and disappointment, and a determination to oppose the doctrines of Cullen, as from a more legitimate motive.

Neither the education of Brown nor his natural character were of the kind the best adapted for the prosecution of medical science. He was originally destined for the ecclesiastical profession; and when he afterwards entered upon that of medicine, he never devoted himself to those elementary studies which are indispensably necessary to a correct knowledge either of theory or of practice. But what he wanted in knowledge he endeavoured to supply by the force of his own genius, and by meditating upon a few general or abstract principles, he ventured to form a new system of pathology, which he announced with a

* For a minute detail of the opinions of Cullen and those of his immediate predecessors and contemporaries, the reader is referred to the learned and ample work of Dr. Thomson, which may be characterized as containing a philosophical history of medicine and pathology during the beginning and middle of the eighteenth century. The account which is given of Cullen's pupils must be perused with much interest, an interest which, in the case of the writer of this article, is exalted by the sacred sentiment of filial piety; p. 461, 644-6. See also *Sprengel*, t. v. p. 359-366. We think that this writer, in criticising the doctrines of Cullen, is somewhat deficient in that candour for which he is in most cases so conspicuous; Encyc. Brit. in loco; *Aikin's* Gen. Biog. in loco; *Kerr*, in Brewster's Encyc. art. "Cullen.

† In this brief sketch we can do no more than merely mention the names of some of our countrymen, who, either by the publication of single cases or of monographs on certain diseases, have contributed to the advancement of pathological or practical knowledge. Among others we may select those of Gregory, the able successor of Cullen, Pringle, M'Bride, Huxham, Fothergill, Cleghorn, Brocklesby, Lind, and Russel. In our own times we have had the no less illustrious names of the Hunters, of Percival, Withering, Johnstone, Falconer, Heberden, Baillie, Haygarth, Ferriar, Currie, Willan, Bateman, Marcet, and Parry. In mentioning the name of Gregory, the writer must be allowed to express the feelings of respect and regard which he has always felt for his preceptor. The elegance of his literary taste, his clear and comprehensive judgment, and more especially the interesting mode in which he conveyed his instruction, all contributed to make him one of the most distinguished ornaments of his profession.

degree of confidence that, while it exhibited the strong powers of his understanding, proved no less the deficiency of his information. Medicine, which had hitherto been a conjectural art, was now to be built upon a few certain and fixed principles, which, by superseding all that had been previously written upon the subject, and by being independent both of observation and of experience, required for its attainment little previous study or learning. The novelty of the attempt, the easy access which it promised to a science which before appeared of difficult approach, and the plausibility of some of its leading positions, acquired for the new theory a prodigious degree of popularity in the university of Edinburgh, where it was first promulgated. Brown had been, in the first instance, patronized by Cullen; but from some causes, both of a personal and a professional nature, which it is not difficult to comprehend, he forfeited the good opinion, and became the bitter antagonist of the doctrines of his former friend. The controversy to which this schism gave rise was carried on for some years with great vehemence, and was by no means confined to the place where it originated. In this country the Brunonian system obtained many adherents when it was first proposed, principally indeed among the students or younger members of the profession; while in some parts of the continent, more especially in Italy, it was adopted by men of learning and science, and became the prevailing hypothesis in some of the most respectable medical schools.

The general principles of the theory are few and simple. He assumed that the living body possesses a specific property or power, termed excitability; that every thing which in any way affects the living body acts upon this power as an excitant or stimulant; that the effect of this operation, or excitement, when in its ordinary state, is to produce the natural and healthy condition of the functions; when excessive, it causes exhaustion, termed direct debility; when defective, it produces an accumulation of excitement, or what is termed indirect debility. All morbid action is conceived to depend upon one or other of these states of direct or indirect debility, and diseases are accordingly arranged in two great corresponding classes of sthenic or asthenic; while the treatment is solely directed to the general means for increasing or diminishing the excitement, without any regard to specific symptoms, or any consideration, but that of degree, or any measure but that of quantity. Such general views and sweeping doctrines, however alluring to the uninformed or the mere theorist, are altogether inapplicable to practice; and it is a subject for our admiration how they could be for a moment entertained by any one who had studied the phenomena of disease, or who was acquainted with the intricate and complicated relations of the different functions and actions of the living system. Accordingly in this country, where, in consequence of the prevalence of the Cullenean school, the attention was more directed to practical than to theoretical details, the professed adherents of Brown were neither numerous nor influential; and even in Italy, where for some time it enjoyed considerable popularity, it has long ceased to be maintained. Yet it must always occupy a distinguished place in the history of medical science, as exhibiting a remarkable example of the force of original and unaided genius in erecting a system plausible and captivating in its aspect, but devoid of the essential support of facts and observations, and therefore fated to share the lot of all systems built on so untenable a basis.*

In connection with Brown, we must notice a theorist whose general principles bore a considerable resemblance to those of the "Elementa Medicinæ," but whose character, talents, and acquirements were of a totally opposite kind. The "Zoonomia" of Darwin exhibits genius and originality; but in no other respect does it bear any resemblance to its prototype. Darwin possessed a knowledge of medicine and all the collateral sciences in their full extent; he was familiar with practice, and had a taste for minute detail and experimental research which, while it appeared to qualify him for a medical theorist, enabled him to give to his system an imposing aspect of induction and generalization. His speculations, although highly refined, profess to be founded upon facts; and his arrangement and classification, although complicated, seems consistent in all its parts. No theory which had ever been offered to the public was more highly elaborated, and appeared to be more firmly supported by experience and observation, while every adventitious aid was given to it from the cultivated taste and extensive information of the writer. Yet the Zoonomia made little impression on public opinion; its leading doctrines rested rather upon metaphysical than upon physical considerations, its fundamental positions were found to be gratuitous, and many of the illustrations, although ingenious, were conceived to be inapplicable and inconclusive. It is now seldom referred to, except as a splendid monument of fruitless labour and misapplied learning.*

CHAPTER XII. — *Remarks on the state of practical medicine at the conclusion of the eighteenth century — State of medicine in France, Lieutaud—State of medicine in Germany, De Haen—State of medicine in Italy, Morgagni, Burserius, Rasori—Epidemics—Improvements in pharmacy.*

While the British physicians were principally occupied in collecting facts and recording their observations, and, with the exception of the temporary suspension which was occasioned by the Brunonian controversy, were more intent in adding to the stock of knowledge than in forming systems, the continental physicians were more disposed to pursue the eclectic plan of Boerhaave. In France this was accomplished with the most success by Licutaud. He was a native of Provence, and was for some years a professor at Aix; in 1749 he was appointed physician to the royal

* *Beddoes's* Observations, prefixed to his edition of Brown's Elements; a writer possessed of originality and genius, but perhaps not unaptly characterized by Rothe as "a blind adherent of the new chemists and of Brown." *M'Kenzie*, in Brewster's Enc., art "Brown." *Parr's* Dict., art. "Brunonian System." *Aikin's* Gen. Biog., in loco. *Sprengel*, t. vi. p. 155-158, 315-334. *Suard*, in Biographie Universelle, in loco.

† *Brewster's* Enc., in loco. *Sprengel*, vol. vi. p. 269-70, 278-9. *Young's* Med. Lit., p. 54-5. *Brown's* Remarks on the Zoonomia, an acute, but rather severe critique. *Suard*, Biographie Universelle, in loco.

hospital at Versailles, and finally to the court of France. He was eminent both as a practitioner and an anatomist; his great work, the "Synopsis universæ Praxeos Medicæ," published in 1765, contains much information on all topics connected with medicine, and is valuable from its real merits in this respect, while it is interesting as affording a correct view of the state of medical science in France at that period. With respect to his general principles, he was an eclectic, uniting certain parts of the old doctrines of the mathematicians and the humoralists with those of Hoffman and the vitalists. (*Hutchinson's* Biog. Med. vol. ii. p. 63 et seq.) Upon the whole, however, we conceive that we shall not be accused of partiality or want of candour if we give it as our opinion, that the views of Lieutaud and his countrymen are less matured than those of his contemporaries in this island or in Holland. We may remark, in speaking of France, that for many years the great seat of medical science in that country was Montpellier. Its university was established in the thirteenth century, and was one of the earliest of those which rose to any considerable eminence; a distinction which it maintained until it was rivalled by that of Paris, which gradually acquired its splendid reputation during the course of the seventeenth century. To the name of Sauvages, who was mentioned above as distinguished for his learned work on nosology, we may add those of Bordeu, Barthez, and Astruc as among the most eminent members of the school of Montpellier. (*Moreau de la Sarthe*, Encyc. Méth. Médecine, in loco.)

Of the medical schools of Germany, the most celebrated during the seventeenth and eighteenth centuries was Vienna. We have already mentioned the exertions that were so successfully made for its advancement by Van Swieten, who was appointed one of its professors in the year 1734. After he had occupied this situation for about twenty years, he associated with himself his countryman De Haën, who materially contributed to support the reputation of the university, particularly by his talents as a practitioner. His great work, entitled "Ratio Medendi," is a valuable repository of facts and observations; upon which we may make the same remark that we offered above respecting Lieutaud's "Synopsis." De Haën has been characterized as a man of great learning united with much practical skill, and a talent for correct observation; but, on the other hand, he appears to have been unreasonably prejudiced against new opinions, and even improvements, in his art; for not only was he one of the most zealous opponents of Haller's theory, but he was no less decided in his opposition to the practice of inoculation, and to the use of various new remedies, which were at that period introduced into medicine, the value of which is now generally recognised. The state of medical theory then prevailing in Vienna was nearly the same with that which was taught in the universities of Leyden and Paris; the doctrines of the humoral pathology may be considered as forming the basis of their hypotheses, but upon these was engrafted a certain portion of the new views respecting the actions of the nervous system and the contractibility of the muscular fibre.

In Italy, which so early acquired a high degree of celebrity for its medical schools, and which still retains a considerable portion of its former reputation, the sciences of anatomy and physiology were cultivated with success, while they were but little attended to in the other parts of Europe. What may be styled anatomical pathology took its rise in Italy in the seventeenth century. The individual to whom the merit of having opened this new road to the improvement of medical knowledge is principally due is Bonet, (*Haller*, Bibl. Med. lib. 10, § 750. t, iii. p. 236 et seq. *Eloy*, in loco. *Dezeimeris*, Arch. Gén. de Méd. xx. 158, 9,) who was born at Geneva in 1620, and at an advaneed period of his life published his great work entitled, "Sepulchretum," which was afterwards enlarged by his learned and industrious countryman Manget. (*Haller*, Bibl. Anat. lib. 7, § 749, t. i. p. 103 et seq. *Haller*, Bibl. Med. lib. 11, § 889, t. iii. p. 603 et seq. *Eloy*, in loco.) The Sepulchretum has been styled "the Library of true Pathology;" it consists of a great collection of cases, in which we have a history of the diseases with the appearances found upon dissection. The plan which had been commenced by Bonet and Manget was followed up by Valsalva, an eminent professor of Bologna, and was still farther perfected by the illustrious Morgagni. This eminent anatomist was a pupil of Valsalva's, and afterwards became professor in the University of Padua, where for nearly sixty years, until his death, which took place in 1771, he devoted himself without intermission to the study of his favourite pursuit. The principal works of Morgagni are his "Adversaria Anatomica," his "Epistolæ Anatomicæ," and more especially his great pathological collection entitled "De Sedibus et Causis Morborum per Anatomiam indagatis." It proceeds upon the plan of Bonet's Sepulchretum, and contains the observations which were made both by himself and by Valsalva, and has always been regarded as a repository of facts and observations on anatomy and pathology uncqualled in extent and in accuracy. (*Eloy*, in loco. *Haller*, Bibl. Anat. lib. 8, § 797, t. ii. p. 34 et seq. *Haller*, Bibl. Med. lib. 12, § 1029, t. iv. p. 424 et seq. *Renauldin*, Biog. Univ. in loco.)

The Institutions of Berserius afford a favourable view of the state of medical science in Italy at this period. He was born at Trent in 1724, studied first at Padua and afterwards at Bologna; he was for some years a professor in the university of Pavia, and finally removed to Milan, where he died in 1785. (Vide Præf. ad Instit. Med. Prac. ed. Lips. 1787.) Burserius was rather an eclectic than an original theorist, but his work is much valued for the information which it contains, and much admired for the elegant manner in which the information is conveyed. Like his contemporaries in Holland, France, and Germany, his doctrines are essentially founded upon those of the humoralists, but to these he unites various parts of those of the solidists and vitalists, and has proved himself deserving of the praise, not only of learning, but of candour and judgment.

We have already had occasion to remark upon the effect which was produced in Italy by the theory of Brown; it was embraced by many of the learned men of that country, and for some

time acquired a considerably greater ascendency over public opinion than it possessed even in its native city. It was not only defended in their publications, but its doctrines were applied to practice, and it was not until their insufficiency had been detected by fatal experience that the delusion was removed.* At the conclusion of the eighteenth century it would seem that the medical theories of the Italians were considerably similar to those of the Cullenean school, and that the Italians, like the English physicians, were little disposed to form systems of medicine, but devoted themselves principally to the cultivation of anatomy and physiology, in addition to the more immediate studies of their profession.

In tracing the additions and improvements which the science of medicine received during the eighteenth century, we must not omit to notice the descriptions of new diseases, either those which were conceived to have actually originated during this period, if there were any such, or those which had not been previously discriminated with sufficient accuracy from others that in many respects resembled them. The various epidemics which, from some unascertained and unexplained causes, have at different times passed over large portions of the surface of the earth; the endemic diseases attached to particular situations, originating in some circumstance connected with the atmosphere, soil, or climate of certain districts, or in the occupation or mode of life of its inhabitants; and lastly, the contagious or infectious diseases, which have invaded entire cities or communities from unknown or at least obscure causes, and after spreading destruction on all sides, have disappeared from causes equally unascertained.

The first of these classes, the epidemic diseases, were made an especial object of attention, in the latter part of the seventeenth century, by Sydenham, whose remarks on them are among the most interesting of his works; also by Morton and by Ramazzini: at a somewhat later period we have the valuable observations of Huxham, of Lancisi and Torti in Italy, and of Stoll at Vienna. The science has been much enriched by various descriptions of the diseases incident to the army and navy, among which we may particularly notice those of Pringle, Brocklesby, D. Monro, Hunter, Lind, Hillary, Blane, Trotter, Larrey, and Desgenettes.† The formidable disease which has been emphatically termed the plague, as it appeared in London, the Low Countries, Marseilles, Moscow, and other parts of Europe, in the latter part of the seventeenth and the beginning of the eighteenth century, and as it still exists in Turkey, Egypt, and the adjoining countries,‡ as well as the less formidable, although more extensive visitations of the influenza, have each had their historians; and it is truly gratifying to observe that in most cases the writers have been more anxious to collect facts and to obtain correct information than to support any particular theoretical views.§

In reviewing the state of medical science during the eighteenth century, and tracing its gradual advancement, we are naturally led to remark upon the great additions which have been made to pharmacy, both in regard to the introduction of new articles into the materia medica, and the improvement that has taken place in the preparation of various substances, and the mode of their administration. It has been remarked that in proportion as our knowledge of the virtues and qualities of medicines has been matured, our pharmacopœia has been simplified, both as to the number of articles employed and the mode of compounding them. Accordingly, if we compare the successive editions of the British pharmacopœias and dispensatories, we shall find that a number of superfluous and inert substances have been from time to time rejected, and that the complex formulæ of the older physicians have been reduced in the same proportion. At the same time some substances of real efficiency have been added, while the improvement in chemical science has enabled us to obtain the active principles of these substances in much more condensed and commodious forms. This remark may be illustrated by Peruvian bark, a remedy which for a long period afforded a fertile field for controversy both as to its power over disease, the nature of its operation, and the mode of its administration. Practitioners have long been aware of the futility of most of the points which were the subject of so much warm and even acrimonious discussion, and are satisfied with recognising its value as a powerful curative agent in certain diseases, without endeavouring to discover the nature of the occult qualities on which its operation depends; while the chemist has lent his aid in pointing out a mode by which its active proximate principle may be procured, detached from the inert matter with which it is naturally combined. The skill of the modern chemist has likewise been most beneficially exercised on the metallic preparations; giving them more fixed and definite combinations, pointing out the modes by which they may be produced with more ease and certainty, and ascertaining the chemical relation which they bear to other substances, so as to indicate how they may be combined with them without decomposition, or even with an increase of their activity.

* Rasori of Genoa appears to have been the first who made his countrymen acquainted with the doctrines of Brown, of which he was a zealous adherent; subsequently, however, he found reason, from the result of experience, to change his opinions, and very candidly and honestly expressed his conviction of their erroneous tendency. An ample account of the pathological doctrines which are at present the most generally received in Italy, under the title of "Nouva Dottrina Italiana," may be found in the various publications of Tommasini, the learned professor of Bologna.

† For a very complete list of works on these subjects the reader is referred to the valuable work of *Professor Ballingall* on Military Surgery, p. 227 et seq.

‡ Hecker's account of the "Black Death," which ravaged so large a portion of the globe in the fourteenth century, may be mentioned as a work worthy of our notice, both as containing many interesting details of this tremendous pestilence, and as exhibiting a curious specimen of medical hypothesis.

§ For the names of the authors who have treated on these topics, we refer to the respective articles of this work. Copious lists of authors may also be found in *Young's* Medical Literature, a work no less remarkable for its learning than for the condensed form in which it is communicated. Much valuable information on this subject will be found in *Sprengel*, sect. 16. ch. 3, art. 2

CHAPTER XIII. — *Cursory remarks on the state of practical medicine since the commencement of the present century—Difficulty of acquiring medical experience—State of medicine in Great Britain—Pathologists of France—Physiologists of Germany—Medical journals—Medical societies—Schools of medicine—Suggestions for the improvement of medical science.*

As the historian of medicine approaches nearer to his own times, he finds his path encumbered with almost insurmountable difficulties. The subject on which he has to treat differs, perhaps, from every other branch of science in this circumstance, that our actual information does not increase, in any degree, in proportion to our experience. Hence it follows that the accumulation of materials frequently rather retards than promotes its progress. In other sciences, although truth is not to be attained without a certain degree of laborious research, yet to those who are willing to bestow on it the requisite attention, it is for the most part attainable, or, if it still elude our grasp, we are at least sensible of the deficiency, and can generally ascertain the precise nature of the obstacles which impede our progress. In other sciences, when we enter upon an inquiry, or propose to ourselves any definite object for experiment or observation, we are able to say whether the result of our inquiry has been satisfactory, and whether the object in view has or has not been accomplished.

But this is unfortunately not the case in medicine. There are certain peculiarities necessarily connected with the subject, which render it extremely difficult to appreciate the value of experiment and observation. In our experiments we are seldom able to ascertain with accuracy the previous state of the body on which we operate, and in our observations we are seldom able to ascertain what is the exact cause of the effect which we witness. The history of medicine in all its parts, and especially that of the materia medica, affords ample testimony to the truth of these remarks. In modern times, and more remarkably in Great Britain, no one thinks of proposing a new mode of practice without supporting it by the results of practical experience. The disease exists, the remedy is prescribed, and the disease is removed; we have no reason to doubt the veracity or the ability of the narrator; his favourable report induces his contemporaries to pursue the same means of cure, the same favourable result is obtained, and it appears impossible for any fact to be supported by more decisive testimony. Yet in the space of a few short years the boasted remedy has lost its virtue, the disease no longer yields to its power, while its place is supplied by some new remedy, which, like its predecessors, runs through the same career of expectation, success, and disappointment.

Let us apply these remarks to the case of fever, the disease which has been styled the touchstone of medical theory, and which may be pronounced to be its opprobrium. At the termination of the last century, while the doctrine of Cullen was generally embraced, typhous fever was called a disease of debility, and was of course to be cured by tonics and stimulants. No sooner was it ascertained to exist, than bark and wine were administered in as large doses as the patient could be induced or was found able to take. No doubt was entertained of their power over the disease; the only question that caused any doubt in the mind of the practitioner was, whether the patient could bear the quantity that would be necessary for the cure.

To this treatment succeeded that of cold affusion. The high character and literary reputation of the individual who proposed this remedy, its simplicity, and easy application, the candid spirit which was manifested, and the strong testimonials which were adduced by his contemporaries, bore down all opposition, and we flattered ourselves that we had at length subdued the formidable monster. But we were doomed to experience the ordinary process of disappointment; the practice, as usual, was found inefficient or injurious, and it was after a short time supplanted by the use of the lancet. But this practice was even more short-lived than either of its predecessors; and thus, in a space of less than forty years, we have gone through three revolutions of opinion with respect to our treatment of a disease of very frequent occurrence, and of the most decisive and urgent symptoms.

Are we, then, to conclude that all medical treatment is of no avail? that it is all imaginary or deceptive? We should feel most unwilling to be compelled to form such a conclusion, nor do we conceive that it necessarily follows from the premises; but we think that the facts prove the importance of extreme caution in forming our conclusions, and still more that mere experience, without the due combination of well regulated theory, is a most fallacious guide. What objection can the man of mere experience, the rejecter of all theoretical deductions, urge against the multiplied testimony that is now presented to us in favour of the Homœopathic doctrine? — what answer can be made to the Report that has been recently brought forward by the medical commissioners of Paris on the subject of Animal Magnetism? The conclusion that forces itself irresistibly on the mind is, that no medical testimony is sufficient to establish a fact which is in itself incredible, and that this previous incredibility can only be ascertained by an extensive and accurate knowledge of the functions and properties of the living body, both mental and corporeal, in all its modifications and under all circumstances, and by a correct and careful generalization of the knowledge thus obtained. These considerations, as well as others which will present themselves to the mind of the reader, may be deemed a sufficient reason for our attempting no more than to offer a few general remarks on the state of medical science during the period at which we are now arrived. We shall therefore devote this chapter to some cursory remarks on the practice of medicine as it now exists in the different countries of Europe, as well as on the state of some of the collateral or auxiliary departments, and shall conclude by some suggestions for the best means of promoting its future progress.

The prevailing and predominant feeling of the most enlightened and the most judicious of the

British practitioners during the period referred to, has been to place little value upon theory, and to devote their minds almost exclusively to the observation and collection of facts. There can be no doubt that this is a less injurious extreme than the opposite; but if the statement which has been made above be correct, it will probably be admitted that this system may be carried too far. And the same exclusiveness has also induced them to pay too little attention to some of the collateral departments of science. In pathology and in pharmaceutical chemistry they have been far outstripped by the French, and in physiology by the Germans. But at the same time that we feel it necessary to pass this judgment on our countrymen, we must fully admit that the spirit of rational empiricism, to which we have referred above as the characteristic feature of the Cullenean school, has produced a most beneficial influence on the general state of medical practice. If it has, on some occasions, produced fluctuation of opinion, and on others indecision or inertness, it has tended to sweep away much error, and to purify the science from many of the antiquated doctrines and practices that still maintain their ground among our continental brethren. This is more especially the case with our pharmacopœias, where, if we compare those of London and Paris, we shall be struck with the number of what we conceive to be useless articles that are still retained in the latter, sanctioned by the authority of the scientific and enlightened body of men who compose the medical faculty of the French metropolis. We are, however, indebted to France for the most important improvements which have taken place in pharmaceutical chemistry: by their method of obtaining the proximate principles of various vegetable substances, and the greater precision which they have introduced into the formation of the metallic preparations, they have conferred a great and lasting benefit on the art, which, among all the revolutions of opinions and practices, can never be contravailed.*

But the glory of French medical science is its pathology. We are justly proud of our Hunters, our Monros, and our Baillie; and there are certain individuals among our contemporaries who are emulously treading in their footsteps. But any feeling of national vanity which we might be disposed to indulge, must be effectually repressed when we look at the illustrious band of French pathologists, when we review the labours of Pinel, Andral, Breschet, Broussais, Corvisart, Cruveilhier, Dupuytren, Laennec, Bayle, Louis, Gendrin, Foville, Chaussier,† and others, who have directed their attention more exclusively to pathology; and when we add to these the names of those who are to be regarded more in the light of physiologists, Bichat, Vic-d'Azyr, Cuvier, Richerand, Magendie, Edwards, Dumas, Legallois, Adelon, Desmoulins, Serres, Blainville, Flourens, St. Hilaire, Dutrochet, and others, we must admit that France exhibits an unrivalled assemblage of medical philosophers. From the united labours of such eminent men it is impossible not to anticipate the most important results; but we believe that we are justified in asserting that, so far as the practice of medicine is concerned, the benefit is still rather in anticipation than in existence. With certain exceptions, but these no doubt very important ones, we should characterize the French practice as decidedly less effective than that of our country; dependence is placed on remedies which we conceive to be inert, and much of the dietetic regimen which enters so largely into the treatment can produce no effect in the removal of disease. In short, their "médecine expectante," although it may be a less dangerous weapon in the hands of ignorance or presumption, is, in the same proportion, less powerful and beneficial when under the direction of skill and judgment.

If France is pre-eminent for its pathology, Germany is no less so for its physiology and its anatomy. The names of Camper, Blumenbach, Ludwig, Sömmering, Meckel, Wrisberg, Reil, Tiedemann, Wenzel, Sprengel, Jacobsen, Carus, Pfaff, Oken, Osiander, Ackermann, Rosenmüller, Gmelin, Walter, and Treviranus, [J. Müller, Wagner, Henle, Gerber, Bischoff, Burdach, Valentin,] may be selected from many others as among the most celebrated throughout Europe, and as having made most important additions to our knowledge on the subjects to which they have particularly directed their attention. Yet in Germany as in France, the effect of this scientific cooperation on the practice of medicine is not yet fully experienced. The treatment of disease is perhaps not more effective than in France, while it is still more encumbered with complicated formulæ and with antiquated practices, which in this country have been discarded because they have been found useless or even injurious.‡ Italy, which so long took the lead in all scientific pursuits, now offers the prospect of a splendid ruin, where we occasionally meet with an illustrious name, such for example as those of Scarpa, Caldani, Mascagni, Rolando, Bellingeri, and Tommasini, but where medical science, if it has not retrograded, has at least remained stationary. The practice of medicine has, however, had some zealous cultivators; we have already remarked on the activity with which the Brunonian controversy was pursued, and the excitement which was then produced seems to have had a beneficial effect in rousing the dormant energy of the mind, of which some traces are still visible.

A circumstance which has materially contributed to the improvement of the knowledge of practical medicine is the publication of periodical works, whether in the form of journals or of the transactions of societies. They have brought before the public the daily occurrences and passing

* We have a very learned review of the state of medicine during the earlier part of the present century, from the pen of the celebrated Sprengel. It is peculiarly valuable, from the numerous references which it contains to the writers of Germany, and from the view that it presents of the opinions which prevail in that country. The German physiologists afford a singular admixture of profound investigation and fanciful mysticism.—Ed. Med. Journ. v. xii. p. 385 et seq.

† We may refer our readers for an interesting account of the progress of pathology since the commencement of the present century, to a series of papers in the Archives Générales de Médecine, by *M. Dezeimeris*, t. xxix. et seq.

‡ In speaking of the practical writers of Germany, it would be unjust to omit the name of Frank, and not to acknowledge the obligation which he has conferred upon medical science. Among the pathologists, Hartmann of Vienna and Conradi of Gottingen are perhaps the best known in this country.

events in a commodious and interesting form, and thus by exciting attention to them have tended both to diffuse and to increase our knowledge on these subjects. It is, however, very much to be regretted that so valuable a mode of communication should, in too many instances, be used as the medium of personal animosity, and that what ought to be employed for the promotion of the welfare of mankind should become a vehicle of the basest and the most malignant passions. On this point, as well as on the one referred to above, justice compels us to state that the French metropolis offers us an example by which we might profit, in the number, extent, and general character of its medical periodicals, and the same sentiment leads us to remark that the medical periodicals of London are decidedly excelled by those of Edinburgh and Dublin. Among the published transactions of medical societies, the Medico-Chirurgical may fairly be selected for our approbation; these, in the short space of about twenty-four years, have amounted to eighteen volumes, and have acquired a character which is too well established to require recommendation or sanction.

In connection with their transactions we may mention the effect of the societies themselves, which, when they are confined to subjects of medical science, must be highly beneficial. Perhaps no single institution has contributed more to the improvement of our profession than the Edinburgh Medical Society, which for so long a period has maintained a reputation that reflects the greatest credit, not merely on its members, but even on the university to which it is attached. It is, indeed, a remarkable and an honourable circumstance that an association, principally composed of students and entirely conducted by them, should have proceeded for above half a century in so uniform a course of respectability; that during this period they should have admitted of free discussion without deviating into licentiousness, and that amidst the fluctuations to which such an association must necessarily be subject, successors have at all times been found able to direct its progress and qualified to support its reputation.

Another circumstance to which we must briefly advert, which is both the cause and the consequence of the progress of our art, is the improved state of medical schools of all descriptions, both those attached to universities or to public hospitals, and those conducted by private individuals. By a very singular anomaly it has happened that in this country the highest medical honours have been hitherto conferred by those bodies who did not profess to give the requisite means for their attainment. This circumstance may, indeed, in one point of view be regarded as paying the highest compliment to the English universities; but we believe that a very general sentiment now prevails among their most respectable members that this anomaly ought no longer to be suffered to exist, and that medical honours ought to be bestowed upon those, and those only, who have gone through with what may be considered a sufficient course of preparatory studies, and who are able to give satisfactory proof that they have taken due advantage of the means of improvement presented to them. But whatever may have been wanting in the English universities has been long supplied by that of Edinburgh, and, at a later period, by those of Glasgow and Dublin. The great London hospitals and some of the private schools, especially those of anatomy, have for a number of years possessed teachers of the highest talents and most admirably qualified for their office; but our metropolis could not be said to hold out the means of a complete medical education previous to the establishment of the London University and the King's College. These rival schools, rivals as we trust they will always be only in the talents of their professors and the excellence of their arrangements, have each of them laid down an academical course of medical instruction which appears to be complete in all its parts, and which must have the most salutary influence on the character and qualifications of the future members of the profession.

The perusal of the foregoing pages will, we trust, enable our readers to form a tolerably accurate conception of the progress of practical medicine, of the obstacles which it has had to encounter, of the degree in which it has overcome these obstacles, and of its present state of improvement. This we are not disposed to underrate; but at the same time we must acknowledge, that when we reflect upon the immense mass which has been written on the subject, the result seems scarcely adequate to the labour that has been bestowed. We may, therefore, be pardoned if we offer a very few remarks on the means by which, as it appears to us, the object in view might be more effectually attained.

This, we think, should be attempted precisely upon the same plan as in other departments of science :—in the first place, by a more careful exposition of facts; and, secondly, by a more careful generalization of them. In medicine there are various circumstances which render it less easy to ascertain the facts than in most other cases. These depend partly on the nature of the subject, and partly on the situation and character of the observer. It was the shrewd remark of a learned professor that in medicine there are more false facts than false opinions. On all topics, either historical, scientific, or literary, mankind possess a strong avidity for the marvellous. From the constitution of the human mind, the love of novelty is one great principle by which the attention is excited and the intellectual powers are called into action. Hence, in a rude state of society, nearly the whole art of medicine consists in the dexterous employment of this agent, and hence it is still found the most effectual method of attracting the notice of the multitude, who are incapable of close reasoning or calm investigation.

Perhaps one of the most easy and at the same time the most effective means of counteracting this mischievous influence, would be never to receive the evidence for any medical facts upon the authority of a single individual. They should, if possible, emanate from associated bodies, either from public hospitals, medical schools, or societies, the officers of which may afford their united testimony to the alleged facts. Another point which appears to us of vital importance, and which bears essentially upon every department of medicine, is that nothing should be received without the name of the author. The custom of anonymous writing,

which has of late increased to so great an extent, has produced the most unhappy effects, both on the state of medical science and on the character of its professors; it has given rise to a degraded and depraved taste, no less at variance with honour and honesty than with the spirit of scientific research. We will venture to assert that no man ought to publish any statement or any opinion to which he would scruple to attach his name. It may occasionally happen that an individual of a timid or a modest disposition may, by this restriction, be deterred from detecting an error or controverting a train of false reasoning, but the loss which might by this means be incurred would be amply repaid by the greater authenticity and the greater correctness of our medical publications.

With respect to the second suggestion, the more accurate generalization of facts, when the facts themselves are fully substantiated,—this must be accomplished by the due exercise of judgment and sagacity, and can scarcely be directed by any general rules. We may remark, however, that one obvious mode of attaining this end is to arrange our insulated facts as much as possible in the form of statistical tables, by which we may readily observe their connection with or relation to each other, and may thus be prevented from forming a hasty or unauthorized conclusion, derived merely from single cases or individual observations.

Another important means of obtaining the object in view is to prescrve great precision in the use of technical and scientific terms. How many controversies have occupied the mind for ages, and have filled almost innumerable volumes, which have essentially turned upon the definition of a word? How frequently have remedies been prescribed, not for the symptoms, but for the name of a disease? How frequently has an article of the materia medica been employed, not from an experience of its actual effects, but from some nominal property assigned to it by an imperfect analogy or imaginary quality? The means that have been proposed to check these aberrations, to rectify the above-mentioned errors, and to reduce medical science to its appropriate and correct limits, are indeed few and simple, and not of difficult application. But there is one essential requisite, without which they can be of no avail,—a mind disposed to the reception of truth, determined to follow it wherever it may lead the inquirer, united to a high sense of moral obligation, which may induce the medical practitioner to bear in mind that his profession is a deposit placed in his hands for the benefit of mankind, and that he incurs an awful degree of moral responsibility who abuses this sacred trust, or diverts it to a base or selfish purpose.

J. Bostock.

[Sketch of the state of American Medicine before the Revolution.*—As may naturally be presumed, in a country circumstanced as the American colonies were for a long period after their original settlement, the medical profession continued for a succession of years in a low and degraded condition. In point of respectability, it undoubtedly stood lower than either the legal or theological professions. The persecutions of the mother country had filled the ranks of the latter with men of learning, talents and piety — while the offices of honour and emolument under the crown, offered allurements sufficiently powerful, to induce many who were distinguished in the law to emigrate to this western world. With medicine it was far otherwise. It is only in populous towns and cities that our art can flourish; and the wilds of America, however fragrant they might be with the spirit of freedom, offered no attractions to the medical men of the old world. The advantages attending an emigration were too distant and precarious to warrant such a step; and accordingly for a long time, with some few exceptions, none but those who had failed to attain respectability or employment at home, would venture on so dangerous an experiment. Nor were the young native physicians for a long time calculated to remedy the evil. To become a well-qualified physician, requires a course of study and a variety of observation which was not to be obtained in any of the colonies. There were neither lectures nor hospitals which could be resorted to, while the great expense attending a foreign education put it out of the power of all, except a favoured few, to avail themselves of the only means of becoming regularly instructed. Under such circumstances it was not to have been expected, for a long series of years after the first settlement of the country, that our profession would be at all distinguished for character or knowledge. The progress of civilization, an augmenting population, together with the increasing facilities of European communication, tended gradually to meliorate this condition of things, and for many years preceding the revolution, medicine could boast of not a few names who shed a lustre upon the profession to which they belonged.

With those preliminary remarks, I propose to give a brief sketch of the state of medicine in this country anterior to the revolution; and, for the sake of convenience, shall consider it under the three divisions of *medical practice*, *medical literature*, and *medical institutions*.

Medical Practice. — The earliest practitioners of medicine in this country appear to have been the clergy — this was at least the case in New-England, where, for several years after the first settlement of the colony, the functions of the physician and divine were performed by the same individual. This combination has not been uncommon in the history of the world. In the early dawn of medicine, the priests of Egypt and Greece collected and preserved what was known of the healing art, and in the infancy of every country the same association will probably be found to exist. Nor is it, by any means, an unnatural one. Physical and moral evil are so intimately connected that those who are administering relief to the one, cannot be regardless of the other. Hence, in the absence of the regular physician, the priest appears to be his most proper representative. Besides this, the character of the first emigrants, and the high tone of religious feeling which drove them for an asylum to this western world, continued for a long time to give a preponderating influence to the

* [This article formed the essential part of the annual address delivered in 1842, before the Medical Society of the State of New York, of which Dr. Beck was then president. The address is published in the transactions of the State Society. — R. D.]

clergy, in all the secular as well as religious concerns of the colony. In the annals of the first colonists, accordingly, will be found the names of several clergymen who practised the healing art. Besides these, some of the first governors of the eastern colonies also practised physic. Two of them, of the name of Winthrop, appear to have been particularly celebrated. One of them was Governor of Massachusetts, the other of Connecticut and New Haven. Of the latter, Cotton Mather says: "he was furnished with *noble medicines*, which he most charitably and generously gave away upon all occasions." (Magnalia, p. 31.) He was a member of the Royal Society of London, and some of his communications are to be found in their transactions. Amid such practice, however, as this must necessarily have been, it is easy to conceive that nothing could be done to improve the state of medicine, and that the greatest facilities must speedily have been offered for successful imposition upon the credulity of the public. This supposition is fully confirmed by the fact that so early as the year 1649, a law was passed in Massachusetts, "that no chirurgeons, midwives, physicians, or others, presume to exercise, or put forth any act contrary to the known approved rules of art, in each mystery and occupation, nor exercise any force, violence or cruelty, upon or towards the body of any, whether young or old, (no, not in the most difficult and desperate cases,) without the advice and consent of such as are skilful in the same art, (if any such may be had,) or at least of the wisest and gravest there present, and consent of the patient or patients, if they be mentis compotes, much less contrary to such advice and consent, upon such severe punishment as the nature of the fact may deserve."* This appears to have been the very first attempt of the civil authority, in any of the colonies, to put a restraint upon those who pretended to the practice of physic. Salutary as this law may have been, in some respects, it afforded but a slender protection against the existing deficiencies in the profession. It made no provision for the education of medical men, and it established no test of their qualifications.

The State of New York, I believe, is entitled to the honour of adopting the first effectual measures for regulating the practice of medicine. This was not, however, until so late a period as 1760, when the General Assembly of the Province ordained that "no person whatever should practise as a physician or surgeon, in the city of New York, before he shall have been examined in physic or surgery, and approved of and admitted by one of his majesty's council, the judges of the supreme court, the king's attorney-general, and the mayor of the city of New York, for the time being, or by any three or more of them, taking to their assistance for such examinations such proper person or persons as they in their discretion shall think fit." (Laws of New York, from 1752 to 1762, by Livingston & Smith, vol. ii. p. 198.) If the person so examined was approved, a certificate was given, allowing him to practise physic or surgery, or both, throughout the province. In case of non-compliance, the penalty was a fine of five pounds.

In 1772, a similar law was adopted in New Jersey. These examples were not imitated in the other colonies, where the practice continued unrestrained, and physicians were responsible to no authority for mal-practice. In Connecticut, an attempt was indeed made to effect a reformation in this respect, but so strong was the current of prejudice against the measure, that it completely failed. As far as my investigations have extended, the foregoing is all that was done, or even attempted by the constituted authorities, in behalf of our profession, previous to the Revolution; and it shows conclusively how little its present respectability is owing either to the colonial governments, or to the mother country.

During the period embraced in this sketch, the division of practice into distinct departments, so generally adopted in Europe, was not recognised in this country. Both physic and surgery were practised by the same individuals; besides this, it was the general custom of physicians to prepare and compound their own medicines. In the year 1765, Dr. John Morgan, a distinguished physician of Philadelphia, endeavoured to introduce a change in the existing mode of practice, by recommending a separation of it into the three branches of physic, surgery, and pharmacy, and appropriating each of these departments to a separate class of practitioners. Having spent several years of his life in the acquisition of professional knowledge, in countries where he had seen the practical operation of this system, he became deeply impressed with the importance of it to improve the character of the profession at home. On his return, he accordingly not merely recommended it in a discourse which he published, but adopted it in his own practice. Although in every respect fully accomplished, he consequently declined engaging in any surgical operations, and confined himself entirely to medicine.† Whatever may be thought of the general utility or propriety of such a plan, it was undoubtedly at that early period somewhat premature, and probably did not meet with much encouragement.

Until about the middle of the last century, midwifery was exclusively in the hands of females, and physicians were called in only in preternatural and tedious cases. According to Dr. Bartlett, of Massachusetts, Dr. James Lloyd was the first systematic practitioner in midwifery in that section of the United States. He had enjoyed the instructions of Warner, Sharpe, Smellie, and Hunter, of London, in 1753, and in the following year settled in Boston. (Medical Communications and Dissertations of the Mass. Med. Soc. vol. 2, p. 244.) In 1756, Dr. William Shippen, Jr., on his return from Europe, commenced the same branch of professional business in Philadelphia; and although at this period physicians were scarcely ever employed in natural labours, it is stated by his biographer, Dr. Wistar, that he did away completely with this prejudice,

* General Laws and Liberties of the Massachusetts Colony, in New England, revised and reprinted by order of the General Council, held at Boston, May 15, 1672.

† A discourse upon the institution of medical societies in America, delivered at a public anniversary commencement held in the college of Philadelphia, May 30, 1765; with a preface containing the author's apology for attempting to introduce the regular mode of practising physic in Philadelphia. Philad. 1765.

and in the course of a few years was fully occupied. (Eulogium on Dr. Wm. Shippen. By Caspar Wistar, M. D., Philad. 1818, p. 31.)

These are the two first physicians employed as regular accoucheurs in this country, of whom we have any notice; and they deserve especial commendation, as having led the way in overcoming deep-rooted prejudices, and in transferring to the profession, from the hands of ignorant and uneducated females, the practice of a difficult and delicate art.

From the connection subsisting between the mother country and the colonies, as may naturally be presumed, the same doctrines prevailed in both, and the practice was essentially the same. At the beginning of the eighteenth century, the celebrated Boerhaave commenced his career. Gifted with every endowment, natural and acquired — a mind powerful and generalizing — a fascinating eloquence — learning the most varied and profound, and a character radiant with every virtue, this great man was eminently qualified to take the foremost lead in the medical world. Not merely the age in which he lived bowed at once to the supremacy of his genius, but his doctrines continued to control the opinions and practice of medical men during the larger portion of a whole century. The leading feature in the system of this distinguished theorist, was the great and undue importance which he gave to the fluids in the production of disease. These, according to him, became variously changed, not merely in their physical properties, but in their chemical composition. They became morbidly thick or thin, while they were contaminated by acid and alkaline acrimonies, and various other morbific matters. To such conditions of the fluids, diseases were attributed; and medicines were supposed to act by counteracting and changing them. Such were the doctrines prevalent in the old world during the last century. Their influence was no less undisputed in this country, and the general practice was modified by them. In the management of diseases, medicines were accordingly given with the view of thinning or incrassating the blood, and altering its qualities. Much confidence was placed in the powers of nature, and the results of critical days watched with the greatest anxiety. On these, it was supposed that the *materies morbi* was discharged, and thus the relief of the patient effected. The matter was looked for chiefly in the urine, and, according to Dr. Rush, "glasses to retain it were a necessary part of the furniture of every sick-room." (Rush's Obs. and Inqs., vol. iv. p. 396.) In the treatment of fevers, sudorific medicines were principally resorted to, and to aid their operation, and to facilitate the elimination of the morbid matter, the supposed cause of disease, patients were confined to their beds, and cool air denied them in the most rigid manner. Bleeding was not a general remedy in fever. In yellow fever, so far as we can judge from the opinions of a single individual, it was considered of doubtful and even dangerous tendency. Dr. John Mitchell, a distinguished physician of Virginia, in his account of the yellow fever which prevailed there in the years 1737, '41 and '42, in speaking of this subject, says, "plentiful bleeding is a means commonly found most effectual to obtain this end, (i. e. to ward off local inflammation,) in the benign inflammatory fevers; but we cannot apply this most effectual remedy in this disease, because it evacuates only or chiefly the red globules of the blood, which, as we see by its state taken notice of above, are in too small a proportion already; and bleeding further breaks the texture of the blood, which above all things is to be avoided in this disease; for after plentiful bleeding, the pulse sinks, or at least is so low and feeble about the state of the disease as to prove of dangerous consequence; which some instances I have known seem to confirm." (American Medical and Philosophical Register, vol. iv., p. 198.) He did not, however, discard bleeding altogether. In small quantities, he found it serviceable to prepare the system for other evacuations. The remedies which he principally relied on were sudorifics, but more especially cathartics. Upon the importance of this latter class of remedies, he dwells with peculiar urgency, and many of his views are characterized by great good sense and practical acumen. It was entirely by the observations and suggestions of this physician, that Dr. Rush, as he himself frankly acknowledges, was afterwards led to the free use of purgatives in the yellow fever of 1793.

In relation to yellow fever, the prevalent opinion at this period was, that it was a contagious disease. Both Drs. Mitchell, of Virginia, and Lining, of Charleston, express decided opinions on this subject. Dr. Lining, too, expresses the belief that, like small-pox and measles, it does not attack the second time. It is hardly necessary to state, that the accurate and extended observations of more recent times have completely disproved both these positions. Indeed, if there be any one point in medicine which may now be looked upon as settled, it is that the yellow fever is not a contagious disease; and numerous observations incontestably show that it may assail the human constitution a second time.*

According to Dr. Rush in his account of the state of medicine between the years 1760 and 1766, bloodletting was used plentifully in pleurisies and rheumatism, but sparingly in all other diseases, (Observations and Inquiries, vol. iv. p. 396,) a practice, it must be admitted, much more judicious and safe, to say the least, than the indiscriminate and sanguinary practice which was afterwards adopted by this distinguished theorist. At this period, according to the same authority, some of the most potent and useful articles of the Materia Medica were but partially exhibited, owing to the prejudices of the public, and in some measure to the fears of the physician. Among them were the Peruvian bark and opium, both of which it was necessary to disguise by admixture with other medicines. Blisters were generally used, but their application was confined to the last stages of fevers. Dr. Rush says "wine was given sparingly even in the lowest stages of what were then called putrid and nervous fevers." (Ibid. vol. iv. p. 399.) Nevertheless, I find that so early as 1746 the liberal use of wine in typhus fever was recommended by that distinguished physician,

* [For the conflicting views on these subjects, see FEVER, YELLOW. — R. D.]

Dr. Colden, Lieut. Governor of the colony of New York. In the year just mentioned, a fever of this description prevailed epidemically at Albany, and in many cases proved fatal. "It had the appearance of a remittent, with frequent low pulse, except in the paroxysms, when it was high; a dejection of spirits, great restlessness, an entire prostration of appetite, clammy sweats of a rancid, putrescent smell." By the physicians of the place, it had been treated as an intermittent, but without success. By the advice of Dr. Colden, Madeira wine, to the extent of a wine glass full every four or five hours, was ordered, and with the happiest effects. One patient who recovered, drank a gallon in a few days. In all these cases the wine was given in the last stage of the disease. (Lond. Med. Obs. and Inq. vol. 1, p. 215.)

Although the physicians in the colonies generally followed the prevalent practice of the mother country, yet they are entitled to the credit of originating some modes of practice of great value. The most important of these is the application of mercury in the treatment of inflammatory complaints. This practice took its origin as far back as the year 1736, and the credit of originality is generally conceded to Dr. Douglass, a physician of Boston, by whom it was used in the angina maligna which prevailed extensively over the colonies at that period, and committed the most dreadful ravages. (New England Journal of Medicine, vol. 14, p. 4.) By Dr. James Ogden, a respectable physician of Long Island, this practice was extensively applied in the same disease about the year 1749. (New York Med. Repository, vol. 5, p. 97.) The preparation of mercury which was used was calomel. In consequence of the success which attended the use of this remedy in this disease, it was shortly after resorted to in other inflammatory complaints; and about the middle of the last century, it was in common use in this country in pleurisy, pneumonia, rheumatism, and others of the phlegmasiæ. I am aware that the credit of this practice is claimed elsewhere;* but there can be no doubt that in its origin it is exclusively American, and that to our colonial physicians the world is indebted for one of the greatest improvements ever made in practical medicine.

Among the events which characterized the history of our colonial medicine, the most remarkable, and certainly the most exciting, were those which attended the introduction of the practice of inoculation for the small-pox. This was first introduced into this country in the year 1721; and it is to a clergyman, Dr. Cotton Mather, that the honour belongs of having first recommended it. During this year the small-pox raged in Boston with unparalleled fury and fatality. Dr. Mather having read, in the Transactions of the Royal Society of London, an account of a new mode of mitigating the violence of the disease by inoculation, as practised in Turkey, communicated it to the physicians of the place, and urged their adoption of it. With the exception of one individual, it was unanimously opposed by the faculty. This individual was Dr. Zabdiel Boylston, who, with the confidence of an honest and enlightened mind, commenced his operations on his own children and servants.† The controversies which ensued were of the most ferocious and disreputable character. Such was the tempest of popular indignation raised against the practice, chiefly by the inflammatory conduct of the physicians, at the head of whom was Dr. Douglass, that both Drs. Mather and Boylston were in danger of losing their lives. Passion and prejudice on the one side were, however, met by decision and success on the other; and inoculation, defended by almost all the clergy, many of whom preached and wrote in its defence, soon triumphed over opposition, and became prevalent in Boston and the neighbouring towns. From thence it was introduced into the other colonies, and although uniformly resisted at first, the public mind became gradually reconciled to it. So early as 1738, it was practised in Charleston, S. C. during the epidemic small-pox which then prevailed there. In 1759 it was generally adopted in Philadelphia, where its dissemination was very much facilitated by a defence and recommendation of it by Dr. Redman. The true merit of Dr. Boylston, in relation to the introduction of inoculation, will not be appreciated unless it is stated that at this time the practice had only just found its way into Europe. By a singular coincidence, the first case of inoculation in Europe took place in England in April, 1721, only two months before the first experiment of Dr. Boylston, and entirely without his knowledge. This was the case of the daughter of Lady Wortley Montague. This celebrated female, during her residence in Constantinople, having become acquainted with the safety of the practice, had her son inoculated, and on her return to England, her daughter was subjected to the same operation, and with perfect safety. (The History of the Inoculation of the Small-Pox, &c. By William Woodville, M. D. vol. 1, p. 85.) This led the way to the speedy diffusion of the practice in England, as the experiments of Boylston did in this country. It is gratifying to know, that although opposed and slandered at home, this eminent physician was appreciated abroad. In 1725 he visited England, and was received with the highest favour and attention by the most distinguished characters in the nation, and even by royalty itself. He was elected a fellow of the Royal Society, it being the first instance in which that honour was conferred upon an American.

Among the practices peculiar to the colonies, was the administration of mercury as a preparative to inoculation. By the illustrious Boerhaave, it had before this been suggested that mercury

* Dr. John Armstrong, in his work on Typhus, gives the sole credit of this practice to Dr. Robert Hamilton of Lynn Regis. In another place, I have shown the incorrectness of this statement. (See New York Medical Gazette, No. 1.) From the account of Dr. Hamilton himself, it appears that his attention was not called to the practice until the year 1764; whereas it had been in very general use in this country many years before.

† The first experiments by Boylston were made on the 27th June, 1721, on his own son, thirteen years of age, and two blacks in his own family, one of thirty-six and the other two years of age, and all with success. During the prevalence of the small-pox in that and the following year, he inoculated with his own hand two hundred and forty-seven, of both sexes, from nine months to sixty-seven years of age. Thirty-nine were inoculated by other physicians after the tumult had somewhat subsided, making in all two hundred and eighty-six, of whom only six died. During the same period, 5,759 had taken the natural small-pox, 844 of whom had died. See Thatcher's Medical Biography, p. 163.

would prove an antidote to small-pox; and from him, no doubt, the hint was taken. In 1724, Dr. Huxham also recommended calomel, not merely in the natural small-pox, but also when inoculated. (Woodville's History of Inoculation, vol. 1, p. 342.) It was only in the colonies, however, that the practice was tried on a large scale; and an interesting account of its effects has been left us by Dr. Benjamin Gale, of Connecticut, in a paper published in the Philosophical Transactions for 1765. The credit of the practice is given by him to Dr. Thomas of Virginia and Dr. Munson of Long Island, by whom it was established in 1745. According to the statements of Dr. Gale, it appears that the deaths from the natural small-pox, before inoculation was introduced into New England, averaged 1 in 7 or 8; when inoculation was introduced, the deaths amounted to 1 in 30. By improvements and proper precautions, they were reduced to 1 in 80 to 100; and finally, by preparing the system by the previons use of mercury, the deaths were only 1 in 800 or 1000.*

For the early and prompt investigation, as well as the sound and original views which they advanced in relation to the pathology and treatment of that acute and now well-known disease, croup, our colonial physicians are entitled to the highest applause. Although not unknown or unnoticed previously, the credit is generally conceded to Dr. Home of Edinburgh, of having given the first full description of this disease. This appeared in 1765. In 1771, Dr. Crawford published his "Disquisitio Inauguralis de Cynanche Stridula;" and in 1778 appeared the elaborate work of Michaelis of Gottingen, entitled "Dissertatio Inauguralis de Anginâ Polyposâ sive membranaceâ." These were all the foreign publications which had appeared on this interesting subject. Between the years 1770 and 1781, in this country, Drs. Rush, S. Bard, Chalmers, Middleton and Bayley, all published in relation to it, and by them, especially the two latter, more correct views were enforced than had been entertained by Home and others. Contrary to the opinion of Home, that the secretion of mucus on the inside of the trachea was the cause of the disease, Dr. Bayley established the fact that the disease was an inflammation of the mucous membrane of the trachea, and that the effusion and false membrane were the consequences of this inflammation. Based upon the idea that it was an acute and rapid inflammation, the treatment recommended was of the most decided character. Bloodletting ad deliquium—the free use of tartar-emetic, at first to produce vomiting, and then to keep up nausea, together with the free use of calomel, were all originally recommended by them, although the credit of every one of them has since been claimed by others.† In determining the true nature of this disease, as well as the treatment most efficacious, the merit of Bayley stands pre-eminent, and the tract which he has left on this subject, is sufficient of itself to establish his reputation as an original observer, and an able and accomplished practitioner.‡

If we may believe the authority of Dr. Douglass, who wrote about the year 1753, and of Smith, the historian of New York, the general character of the profession could not have been very elevated, and quackery must have flourished in great perfection. Smith says, "few physicians amongst us are eminent for their skill. Quacks abound like locusts in Egypt, and too many have recommended themselves to a full practice and profitable subsistence. This is the less to be wondered at, as the profession is under no kind of regulation." (History of New York, by William Smith, A. M. p. 326.) That in a state of

* Historical Memoirs, relating to the practice of Inoculation for the small-pox, in the British American Provinces, particularly in New England. By Benjamin Gale. See Philosophical Transactions, abridged, vol. 12, p. 229.

† As a sample of the manner in which practices originating in this country, are appropriated abroad, not from design, but ignorance, the following may be adduced. Dr. Stokes, in his recent and invaluable treatise on diseases of the chest, in speaking of tartar-emetic in croup, holds the following language: "For the introduction of this inestimable remedy in the treatment of the croup, the science is indebted to Dr. Cheyne. In his Essay on Cynanche Trachealis, published in Edinburgh in 1801, we find the treatment recommended; and it is no small evidence in its favour, that in the year 1832, after an experience greater than falls to the lot of most men, the opinions of this philosophical investigator of disease have remained unaltered. How changed would be the character of medicine, if, in support of many of our remedies, there could be brought forward such evidence, and such an advocate!" p. 144, Amer. Ed. Dr. Bayley recommended and used the same remedy, in the same way, and with the same objects in view, a quarter of a century before.

‡ Cases of Angina Trachealis, with the mode of cure: in a letter to William Hunter, M. D. &c. By Richard Bayley, Surgeon. Printed, New York, 1781. For the purpose of showing the views of Bayley in relation to the nature and cure of this disease, I shall quote the following from his paper. "When the Angina Trachealis is theoretically considered, there will probably be formed (as is generally the case when facts are not ascertained) opinions as various as the information and different faculties of men may suggest. I am induced to adopt the following: That the larynx, aspera arteria, and bronchial pipes have one common membrane, which, we are informed by injection, consists of little more than an infinity of blood-vessels, and consequently liable to *inflammation*, as all vascular parts are. An increased action of these vessels (as in pleuritic and puerperal fevers) occasions a preternatural secretion of lymph, which, from the ingress and egress of the air, becomes condensed, and assumes the appearance of a membrane, and its compactness will depend on the age and habit of the patient and the state of the atmosphere.

"The common opinion is, that those who die of this complaint are suffocated by the membrane's closing the wind-pipe. Another more respectable opinion is, that a spasm of the muscles of the larynx closes the scene. The circumstances which precede *death* in this disease, compared with those appearances which have regularly taken place in the cases which I have seen *successfully* treated, sufficiently explain the cause of the patient's death from the laws of the blood's circulation. To preserve the healthful state of an animal, it is necessary that the whole mass of blood should circulate through the lungs in a given time, and the free admission and expulsion of air contributes to this regular process; the change, also, which gradually takes place in the lungs, seems more directly to account for the swelled face, tumid jugulars and the full staring eyes, which are symptoms that accompany the progress of this complaint and add to this, the larynx, aspera arteria and bronchia have been found pervious in every subject I have dissected, while the ramifications have been as regularly filled with a glairy mucus.

"From what precedes, it is obvious that the angina trachealis is considered as an *inflammatory disease*, the treatment of which must vary in every degree, according to its violence: and though the common antiphlogistic treatment will in some cases relieve, if early applied, yet the most desperate may yield to *repeated bleedings ad deliquium* from the jugulars, the free use of *tartar-emetic* and other evacuants, with a *large blister* covering the larynx and aspera arteria, while the mucus filling up the ramifications of the bronchia may be emptied by the action of vomiting." See New York Medical Repository, vol. 14, p. 346. Although not published until the year 1781, the paper of Bayley contains the result of his observations and practice for a number of years previously.

society where the means of medical education were so scanty, and where no laws existed to regulate the profession or restrain admission into its ranks, quackery should be very rife, is certainly by no means singular. It would be unjust, however, to suppose that it is peculiar to such a state of society, or even that it prevailed to a greater extent than it does in the present day. Mortifying as it is, it is, nevertheless, a fact that it is peculiar to no particular age, or country, or state of society. It has existed from the earliest periods, and will continue to exist as long as human beings are found upon the face of the earth. The rude savage and the polished citizen are equally its victims, and civilization and refinement only render its forms more complicated and insidious. At no period in the history of this country, it may safely be asserted, has empiricism flourished to the same fearful extent as at the present time, notwithstanding our boasted improvements in other respects. Assuming a thousand different disguises, it is, in many high places in our country, sapping the very honour of the profession, and corrupting it to the core. Notwithstanding the prevalence of quackery in the colonies, it does not appear that the well-educated part of the profession lent it any countenance, and it would be well if the same could be said in the present day. A recollection of these facts should therefore moderate somewhat the severity of our judgment in relation to the state of our colonial medicine, at the same time that it should excite us to renewed diligence in endeavouring, if possible, to correct existing abuses.

II. *Medical Literature.*—I come next to take a brief notice of the state of medical literature previous to the revolution. Although not abounding in materials of very high interest or importance, the medical literature of this period is by no means contemptible. In forming a judgment in relation to it, we should recollect the circumstances in which the American physician was placed, and the slender inducements which were held out to undertake the labours of authorship. The two great motives which induce men, in any age, to write — the love of literary distinction, and the hope of pecuniary gain, then exercised but a feeble and limited influence; and accordingly, the colonial physicians only turned authors on some special emergency of public duty, or for the purpose of promulgating and enforcing some new and useful mode of practice. The capabilities of our early physicians, therefore, ought to be judged of, not so much by the quantity, as by the quality, of the productions which they have left us; and an impartial review of them will show us that they do not suffer by a comparison with the productions of their European brethren at the same period. Some of them were not thought unworthy of being published in the Transactions of the Royal Society, while others found a place in the publications of the learned medical associations of the day, in the mother country.

A brief review of what appeared in the colonies, will be, not merely interesting, as a matter of historical record, but will furnish the best evidence of the general drift and progress of medical mind during this period.

The earliest medical publications appeared in Massachusetts, and were called forth by the prevalence of epidemic diseases; and the first appears to have been a tract by Thomas Thatcher, a clergyman and physician, of Massachusetts. It was entitled "A Brief Guide in the Small-Pox and Measles," and was published in the year 1677. Cotton Mather, in his Magnalia, gives the life of this person, and represents him as a man of learning and ingenuity.

In 1721, Benjamin Colman, a minister of Boston, printed a small pamphlet entitled—"Some Account of the New Method of Receiving the Small-Pox, by Ingrafting or Inoculating;" in which he defends the practice of inoculation, which had just been introduced by Dr. Boylston.

Five years after this, Dr. Boylston, while on his visit to England, published there, at the request of the Royal Society, "An Historical Account of the Small-Pox, inoculated in New England." In the following year it was reprinted in Boston.

In addition to the above may be mentioned the names of Thomas Howard and Nathaniel Williams, both of whom were clergymen as well as physicians. The former wrote a Treatise on Pharmacy, in 1732; and the latter a pamphlet "On the Method of Practice in the Small-Pox in 1730."

The most voluminous writer, however, who appeared at this period, was Dr. William Douglass. He was a native of Scotland, and emigrated to New England about the year 1716. Although a man of talent and learning, he appears to have been of an unhappy temper of mind, to which he gave loose in many of his writings. He was a most virulent opponent of the practice of inoculation, and did all in his power to excite popular indignation against it. Besides several publications on this subject, he has left a tract on the putrid sore throat distemper which prevailed epidemically in the colonies, entitled—"The Practical History of a New Epidemical Eruptive Miliary Fever, with an Angina Ulcusculosa, which prevailed in New England in 1735 and '36." This was published in 1736, and is in every respect a paper of great value. Besides giving the fullest account that we have of this dreadful epidemic, it contains the first suggestion in relation to the use of calomel as a remedy. This essay has recently been reprinted in the New England Journal of Medicine and Surgery, vol. xiv. p. 1. The most elaborate work, of this author was "A Summary, Historical and Political, of the First Planting, Progressive Improvements, and Present State of the British Settlements in North America." This was published in 1760, and contains some amusing notices of the state of the profession in the colonies.

These were pretty much all the medical writers of whom Massachusetts could boast for upwards of a century and a half.

In the middle and southern colonies, medicine appears to have been cultivated with much more success than in the eastern. This may be accounted for by the fact that the former enjoyed the services of several foreign physicians, who had early emigrated thither, enriched by the best medical education which Europe could afford. It appears also to have been more common with them

to send their young men to foreign universities to complete their medical studies. In addition to all this, a taste for researches in natural history began to develop itself much sooner in some of the southern colonies, and doubtless produced a salutary effect in spreading the influence of liberal sentiments. To these causes is to be attributed the early superiority of the southern colonies more especially.

Of the colonial physicians none were more active or distinguished than those of South Carolina. In 1734, a native of this state, William Bull, obtained a degree in medicine, at the University of Leyden, and on that occasion, defended and published an inaugural dissertation, "De Colica Pictonum." He had studied under Boerhaave, and seems to have commanded the respect of his associates. By the celebrated Van Swieten, he is spoken of in his commentaries as the *very learned* W. Bull.* In 1749, John Moultrie received the degree of doctor in medicine, at the University of Edinburgh, and published a thesis, "De Febre Flavâ." He was the first native Carolinian who obtained this honour at that university. According to Dr. Ramsay, ten other native Carolinians obtained the same honour, between the years 1768 and '78. (Ramsay's Review of Medicine in the 18th century. New York Medical Repository, vol. iv. p. 398.) As more particularly distinguished in this section of the country, the names of Drs. Lining, Chalmers and Garden, deserve to be especially noticed. They were all natives of Scotland, and emigrated in the earlier part of the last century. Being men of unquestioned abilities, learning and enterprise, they contributed greatly, both by their influence and writings, to elevate the character of the profession. To Dr. John Lining, we are indebted for some of the most valuable statical experiments ever published. They were continued throughout the whole of the year 1740. He ascertained his weight in the morning and evening; the weight of the food which he swallowed, and the weight of the urine and alvine excretions ejected. The result of these troublesome experiments was published in 1743, in the Transactions of the Royal Society of London. (Vol. xlii. p. 491. Thomson's History of the Royal Society, p. 129.) In 1753 he published "A Description of the American Yellow Fever," in a letter to the celebrated Dr. Robert Whytt, professor of medicine in the University of Edinburgh. This was the first account of this terrible disorder which had emanated from this continent, and stands to this day unrivalled for the general accuracy and minuteness of its description. (Edinb. Essays and Obs. vol. ii. p. 370.)

To Dr. Lionel Chalmers we are also indebted for several valuable productions. In the year 1754 he communicated to the Medical Observations and Inquiries of London, a paper on the *Opisthotonos and Tetanus*. These appear to have been very prevalent, at that time, in Charleston, and Dr. Chalmers seems to have had a large experience in them. The remedies which he principally recommends are, bloodletting in the commencement, the warm bath, the free use of opium and emollient enemata. (Vol. i. p. 87.) In 1768, he published "An Essay on Fevers," in which he enters into an extensive discussion of the theory of febrile diseases, and proposes a new method of treating them. Contrary to the prevalent belief of the time, Dr. Chalmers endeavours to show that the cause of fever is not to be sought for in the fluids, but in the solids, and he considers the immediate cause to be "a spasmodic constriction of the arteries and other muscular membranes." Whatever can give much pain or stimulate the nerves so as to cause them to excite such constrictions, he thinks may bring on fever. As an inevitable consequence of this spasm and constriction, irregular distributions of blood take place, producing engorgements of the different viscera, and to this irregular circulation are owing all the phenomena of fever. Spasm of the extreme arteries and irregular distribution of the blood being the leading features of fever, he recommends two indications in the treatment. First, to relax the spasm—second, to relieve the internal fulness of the system; and the two agents which he recommends for accomplishing these purposes are, sweating and purging. Such is a very brief account of his theory of fever, which he supports with much talent and learning. The whole work displays a compass of observation, and a power of theoretical discussion, which should have raised its author to a higher rank than he seems to hold in the lists of medical fame. To perfect originality, the theory of Dr. Chalmers can lay no claim. The doctrine of spasm had been previously suggested by the celebrated Hoffmann, from whom both Chalmers and Cullen doubtless borrowed it. Whether Chalmers was at all indebted to Cullen for any of his views on this subject, it is not easy to say, although it seems very improbable, the essay of Dr. Chalmers having appeared several years before the "First Lines" of Dr. Cullen were presented to the public. Besides this, Dr. Chalmers was the author of an extensive and valuable work on the climate and diseases of South Carolina, in two volumes.† He also recorded and published an important series of meteorological observations at Charleston, continued for ten years, i. e., from 1750 to 1760.‡

Dr. Alexander Garden was another distinguished physician of Charleston at this period. From all the accounts which we have left of him, he appears to have been a man not merely thoroughly versed in his profession, but highly accomplished in literature and general science. He was much devoted to natural history; and the Transactions of the Royal Society contain several of his papers on this department. As a proof of the high estimation in which he was held, it may be mentioned, that Linnæus, with whom he corresponded in Latin, gave the name of Gardenia (in honour of him) to "one of the most beautiful flowering shrubs in the world." He was a member of the Royal Societies of Upsal and of London. The

* Hæc colica in regionibus Americæ meridionalibus tam frequens est, ut fere pro morbo endemio haberi possit; uti ab *eruditissimo* viro Gulielmo Bull, in his oris nato, et, nunc feliciter ibi medicinam exercente, sæpius audivi, qui et pulchram de hoc morbo scripsit dissertationem inauguralem, quam de academia Lugduno Batava defendit anno 1734. Van Swieten's Commentaries, vol. iii. p. 357.

† An account of the Weather and Diseases of South Carolina, by Lionel Chalmers, M. D., of Charleston, S. C., 2 vols. London, 1776.

‡ A general table of the results of these observations may be seen in his work on Carolina, vol. i. p. 42.

only medical production which he has left, is an account of the anthelmintic properties of the *Spigelia Marilandica*, together with a botanical description of the plant.*

Virginia could also boast of some distinguished men in the profession; and among these especially were Clayton and Mitchell. Dr. John Clayton was of English origin, and came to Virginia about the year 1705. (Thatcher's Medical Biography, p. 224.) He was particularly eminent as a botanist, and devoted a long life to the investigation of the plants of Virginia. As the result of his labours, he published in 1743 a *Flora Virginica*. It was afterwards republished by Gronovius at Leyden, in 1762.† Besides this, he published in the Philosophical Transactions several papers in relation to the culture of the different varieties of tobacco, together with a full account of the medicinal plants of Virginia. The celebrated author of the Notes on Virginia has left the following respectful testimony to the character of this eminent naturalist and physician: "This accurate observer was a native [incorrect] and resident of Virginia, passed a long life in exploring and describing its plants, and is supposed to have enlarged the botanical catalogue as much as almost any man who has lived." (Notes on Virginia, by Thomas Jefferson, p. 63.)

Dr. John Mitchell was another Englishman who emigrated to Virginia about the beginning of the last century, and no less distinguished for his attainments in medicine and natural history. The productions by which his name has been handed down to posterity are, "An Essay on the Causes of the Different Colours of People in Different Climates," and "Letters on the Yellow Fever of Virginia." The first of these is a production of no ordinary character. It was published in the Philosophical Transactions of 1743, and occupies about fifty pages. The first part of this paper is occupied with the consideration of the cause of the colour of the skin generally, and he endeavours to establish the following propositions: 1. That the colour of white people proceeds from the colour which the epidermis transmits; that is, from the colour of the parts under the epidermis, rather than from any colour of its own. 2. That the skins of negroes are of a thicker substance and denser texture than those of white people, and transmit no colour through them. 3. That the part of the skin which appears black in negroes is the corpus reticulare cutis, and external lamella of the epidermis; and all other parts are of the same colour in them with those of white people, except the fibres which pass between these two parts. 4. That the colour of negroes does not proceed from any black humours or fluid parts contained in their skins, for there is none such in any part of their bodies, more than in white people. 5. The epidermis, especially its external lamella, is divided into two parts by its pores and scales, two hundred times less than the particles of bodies, on which their colours depend. Having established these propositions by a series of facts and reasonings, he comes to the conclusion that the proximate cause of the colour of negroes is three-fold, viz.: the opacity of their skins, proceeding from the thickness and density of their texture, which obstructs the transmission of the rays of light from the white and red parts below them; together with their greater refractive power, which absorbs those rays, and the smallness of the particles of their skins, which hinder them from reflecting any light. The difference thus depending upon a difference in the texture of the skin, he next proceeds to show that the different colours of the human race can readily be explained by the effect of climate and mode of life, in modifying the texture of the skin. He supports the scriptural doctrine of the common origin of man, and thinks the primitive colour was a medium between white and black; "from which primitive colour the Europeans degenerated as much on the one hand as the Africans did on the other: the Asiatics,—unless, perhaps, where mixed with the whiter Europeans,—with most of the Americans, retaining the primitive and original complexion.‡ Such is a brief account of this most ingenious and elaborate paper. Any analysis of it, however, must do it injustice. To appreciate the philosophical acumen and learning which it displays, it ought to be read at full length.

Another paper by Dr. Mitchell is an account of the yellow fever which prevailed in Virginia in 1741, of which I have already had occasion to speak in a previous part of this discourse. This was not published at the time, but the manuscript fell into the hands of Dr. Franklin, by whom, a short time before his death, it was given to Dr. Rush. It has since been published in Coxe's Medical Museum, and in the Medical and Philosophical Register of New York. (Two Letters, vol. iv. pp. 183, 383.)

Another physician of Virginia, and a native, Dr. John Tennent, deserves to be mentioned, as having written the first account of that valuable medicine, the *Polygala Senega*. By him it was used freely, after depletion, in pleurisy and peripneumony, and, as he states, with great success. This appeared in 1736. (See Edinburgh Medical Essays and Observations, vol. v. p. 376.)

Among the medical men of Pennsylvania, there are several who are entitled to notice, as having contributed to the colonial literature of our profession. In 1740 Dr. Thomas Cadwallader, of Philadelphia, published "An Essay on the Iliac Passion," in which he exposes the absurdity of the practice then in vogue, viz.: that of treating it by quicksilver and drastic purges. He recommends in their stead, mild cathartics, with the occasional use of opiates. (Miller's Retrospect of the Eighteenth Century, vol. i. p. 317.) By Dr. Thomas Bond, an eminent physician of Philadelphia, two communications were published in the London Medical Observations and Inquiries, one an account of a worm bred in the liver, (Vol. i. p. 68,) 1754; another on the use of bark, in scrofulous cases, 1759. (Vol. ii. p. 265.) The men, however, who were particularly distinguished, in Phi-

* Edinb. Essays and Observations, Physical and Literary, vol. 3, p. 145. For an interesting account of Dr. Garden, see Ramsay's History of South Carolina, vol. ii.

† Flora Virginica exhibens plantas quas nobilissimus vir D. D. Johannes Claytonus Med. Doct. &c. in Virginia crescentes observavit, collegit et obtulit D. Joh. Fred. Gronovio, cujus studio et opera descriptæ et in ordinem sexualem systematicum redactæ sistuntur. Lugduni Batavorum 1762.

‡ See the Abridgement of the Philosophical Transactions, by Drs. Hutton, Shaw and Pearson. Vol. 9, p. 50.

ladelphia, for their zeal in the cause of medical science, were Drs. John Morgan and William Shippen, both natives of that place, and the founders of the first medical school established in this country. Dr. Morgan, after studying medicine at home, went to Edinburgh, where he received the doctor's degree, on which occasion he published an elaborate thesis on the formation of pus—"Tentamen Medicum de Puris Confectione, Edinburgh, 1763." In this dissertation he maintained the doctrine that *pus is a secretion*, prepared by a peculiar action of the secretory vessels of the part. The credit of originality, as it regards this doctrine, has generally been awarded to the celebrated John Hunter. The evidence, however, appears to be conclusive that he was anticipated by Dr. Morgan.* After receiving his degree at Edinburgh, he travelled for some time on the continent, industriously engaged in acquiring knowledge, and everywhere received with the highest honour. As a proof of the estimation in which he was held abroad, it is only necessary to state, that on his return home, in 1765, he was a fellow of the Royal Society of London, corresponding member of the Royal Academy of Surgery of Paris, and licentiate of the Royal Colleges of Physicians of London and Edinburgh. Notwithstanding his devotion to science, Dr. Morgan was not a prolific author. Besides his Thesis, all that we have left is his "Discourse," already noticed, "On the Institution of Medical Schools in America," in 1765, and "A Recommendation of Inoculation, according to Baron Dimsdale's Method," 1776.

Dr. Shippen was born in 1736, and about the year 1760 took his degree at Edinburgh, on which occasion he wrote and published a thesis, "De Placentæ cum Utero Nexû." Besides this, I do not know that he published any thing, but he is greatly and justly celebrated as the first person who lectured on anatomy in this country.

Last, though not least, the contributions of the eminent men who adorned our profession in New York, require to be briefly commemorated. Among these, the first place is unquestionably due to Cadwallader Colden. He was a native of Scotland, and received his education at the university of Edinburgh. In 1718, he settled in New York. He soon, however, relinquished the practice of physic, and became a public character, holding in succession the offices of surveyor-general of the province, member of the council, and finally lieutenant-governor. Although thus withdrawn from the profession, he did not lose his fondness for medical and philosophical pursuits. Among his medical productions is an "Account of the Climate and Diseases of New York." This was published when he was surveyor-general of the province, about the year 1720. It is an exceedingly interesting paper, giving as it does the only account we have of the climate and diseases of this city, at so early a period. In relation to consumption, now so fatally prevalent, he makes the following interesting remarks: "The air of the country being almost always clear, and its spring strong, we have few consumptions, or diseases of the lungs. People inclined to be consumptive in England, are often perfectly cured by our fine air, but if there be ulcers formed, they die in a little time." (Medical and Philosophical Register of New York, vol. i. p. 309.) He also wrote "Observations on the Fever which prevailed in the City of New York in 1741–2," in which he made a number of valuable suggestions in relation to the draining and purification of the city, with the view of preventing the recurrence of the disease. (Ibid, vol. i. p. 324.) Besides these he published a treatise "On the Cure of Cancer," another "On the Virtues of the Great Water Dock," (Ibid. vol. i. p. 300); also, a letter on the "Sore Throat Distemper, which prevailed epidemically in this country," in 1735. (London Med. Obs. and Inq. vol. i. p. 215.) Dr. Colden also pursued the study of botany with great assiduity. He described between three and four hundred American plants, which were afterwards printed in the Acta Upsaliensia. In honour of his daughter, who imbibed the ardour of her parent in this science, Linnæus named a plant of the tetandrous class, that was first described by her, *Coldenia*.

Dr. John Bard was long an eminent practitioner of New York. His professional writings, however, are few. They are—"A Case of Extra-Uterine Fœtus," published in 1760, in the London Obs. and Inq. (vol. ii. p. 369); several papers on the nature and character of the yellow fever, and "An Essay on the Nature and Cause of the Malignant Pleurisy," which proved so fatal to the inhabitants of Huntington and some other places in Long Island in the winter of 1749. (Med. and Philos. Register, vol. i. p. 409.)

Of the physicians of New York, none were more distinguished for their learning and ability, than Dr. Peter Middleton. On the formation of the medical school in New York, he was appointed professor of the theory of physic. At the opening of the school, in 1769, he delivered a discourse in which he took an extensive survey of the state of medicine among the different nations of the globe. This production was afterwards published, and affords ample proof of the learning and ability of the author.† He also wrote a valuable practical letter on the "Croup," already alluded to.‡

Dr. John Jones was a native of Jamaica, Long Island, and was born in 1729. Having acquired the elements of his profession at home, he repaired to Europe, and enjoyed the advantages of tuition under the most renowned men of our profession at London, Leyden, Paris, and Edinburgh. On

* See Cullen's First Lines, edited by Professor Charles Caldwell, vol. i. p. 225, note by Prof. Caldwell. Dr. James Curry, lecturer at Guy's Hospital, also gives the credit of priority to Dr. Morgan, and he adds: "I could not avoid giving that merit to Dr. Morgan, who discussed the question with great ingenuity, in his Inaugural Dissertation, on taking his degree at Edinburgh, in 1763; whilst I could find no proof that Mr. Hunter had taught, or even adopted, such an opinion, until a considerably later period." See Lond. Med. and Phys. Journal for 1817; also New England Journal of Med. and Surg. vol. vi. p. 404.

† A Medical Discourse or an Historical Inquiry into the Ancient and Present State of Medicine; the substance of which was delivered at the opening of the medical school in the city of New York: by Peter Middleton, M. D. and Prof. of the theory of physic in King's College: New York, 1769, pp. 72. A copy of this is in possession of the writer.

‡ This letter was published in 1780, and addressed to Dr. Richard Bayley. In it, he sanctions the practice of Dr. Bayley, as confirmed by his own experience. See New York Med. Repository, vol. xiv. p. 347.

his return to his native country, he speedily rose to the highest eminence. As a surgeon, he undoubtedly stood first in this country. In 1768 he was selected to fill the honourable station of professor of surgery in the medical school of New York, and ranked high as a teacher. The only work of any consequence which he has left us is a volume upon wounds and fractures, published in 1776.* A new edition of this work was printed in 1795, with memoirs of the author, by James Mease, M. D., of Philadelphia. Besides this, there is an interesting paper "On Anthrax," by Dr. Joncs, in the first part of vol. i. of the Transactions of the College of Physicians of Philadelphia.

Before closing this account of our colonial medical literature, it would be unjust not to notice the Transactions of a Society, which contributed in no small degree to raise the scientific character of the country. I mean, the American Philosophical Society. The first volume of their proceedings was published anterior to the revolution, and contains some papers on important medical subjects. It may be stated, too, that four American physicians were elected fellows of the Royal Society of London, before the revolution. These were, Drs. Boylston, Mitchell (of Virginia), Garden, and Morgan. Besides these there were ten other Americans who had been raised to the same honour, viz: four of the name of Winthrop, Paul Dudley, President Leverett, Thomas Brattle, Cotton Mather, Benjamin Franklin, and David Rittenhouse. (Ramsay's America, vol. i. p. 271.)

No medical journal of any description appears to have been published until after the war of our independence, and the only inaugural dissertation that was published was from the New York College, in 1771, by Samuel Kissam, M. D., on the Anthelmintic Virtue of the *Phaseolus Zuratensis Siliqua Hirsuta*, or Cow-Itch, a copy of which may be seen in the library of the New York Historical Society.

III. *Medical Education and Institutions.*—Under this head may be embraced all those acts and establishments of the colonial governments, whose object was the preservation of the public health, as well as those institutions of a public nature, which originated from the combination of individual enterprise and liberality.

From the commercial character of the country, it may readily be supposed, that our first medical establishments were lazarettos, or hospitals intended for the reception of seamen and others infected with contagious disorders. Accordingly we find a hospital of this description established by Massachusetts, nearly one hundred and fifty years ago, at Rainsford island, in the harbour of Boston. Another was at an early period erected on State island in the Delaware, and appropriated to similar purposes for the port of Philadelphia. After the practice of inoculation had become settled, hospitals were gradually established in different parts of the country, for the purpose of carrying patients through this process. Several of this description were in existence shortly after the middle of the last century. These were, however, entirely the result of private enterprise, without any legislative aid, and were, therefore, only of temporary duration. Among the physicians who devoted themselves to this kind of business, Dr. Barnet of New Jersey seems to have been the most conspicuous. Useful as the foregoing institutions undoubtedly were, they could not have produced any effect of consequence upon the existing state of medical science. In 1750, a project of a higher order was set on foot in Philadelphia; this was the establishment of a hospital, upon the plan and embracing all the advantages of the European hospitals, and the individual with whom it originated was Dr. Thomas Bond. No sooner was the object proposed to the citizens of Philadelphia, than measures were adopted to carry it into execution. For that purpose, a petition was presented to the Assembly of the colony soliciting the aid of that body, the result of which was a grant of £2000, on condition that an equal sum should be raised by subscription. The proposed amount was speedily raised; and early in the year 1752, patients were admitted into a building which had been procured for their temporary accommodation. The erection of the present building was not commenced until 1755. In the year 1769, a similar project was started in New York, and the credit of first suggesting it is due to the late Dr. Samuel Bard. In consequence of a public discourse delivered by him, a general interest was excited in the measure.† The liberal contributions of the governor of the province, (Sir Henry Moore,) the corporation of the city, and the legislature of the province, enabled the governors to commence the erection of the building in 1773. After being nearly completed, it accidentally took fire, and was nearly consumed, in 1775. The present building was not completed until 1791, when it was opened for the reception of patients. (An Account of the New York Hospital, 1811.) These were all the hospitals that were attempted anterior to the revolution.

Among the most singular features connected with the history of our colonial medicine, is the fact that so little attention was paid to professional education. This is the more remarkable, inasmuch as our colonial ancestors were fully alive to the importance of general instruction, and the most honourable efforts were made to establish it

* Plain Concise Practical Remarks on the Treatment of Wounds and Fractures; to which is added an Appendix on Camp and Military Hospitals. Principally designed for the use of young military and naval surgeons in North America: by John Jones, M. D., professor of surgery in King's College, New York: pp. 114—Philadelphia, 1776.

† The agency of Dr. Bard is mentioned in the following terms by Dr. Middleton, in his Discourse delivered 1769. "The neccssity and usefulness of a public infirmary, has been so warmly and pathetically set forth in a discourse delivered by Dr. Samuel Bard, at the commencement in May last, that his excellency Sir Henry Moore immediately set on foot a subscription for that purpose, to which himself and most of the gentlemen present liberally contributed. His excellency also recommended it, in the most pressing manner, to the Assembly of the province, as an object worthy of their attention; and the corporation of the city have given assurance of granting a very valuable and commodious lot of ground for erecting the building upon; so that there is now almost a certain prospect of this benevolent and humane foundation soon taking place; and as it is to be on the most catholic and unexceptionable plan, it is to be hoped that it will meet with the countenance and encouragement of every compassionate and good member of society, whatever party or denomination he may choose to be distinguished by on other occasions." Note, p. 60.

on a respectable foundation. So early as the year 1638, Harvard University, in Massachusetts, was founded. In 1691, William and Mary College, in Virginia; in 1700, Yale College, in Connecticut; and in 1746, Princeton College, in New Jersey, were severally established; yet in none of them was any provision made for instruction in medical science. With the single exception, too, of New York, already noticed, and that so late as 1760, the law imposed no qualifications upon those who entered the profession, nor were they subjected to any examinations. The education of physicians, therefore, at this period, restricted as it was to the personal instruction of those with whom they studied, must have been limited indeed. The only mode of supplying this deficiency, was by resorting to foreign countries; and it appears that almost all the distinguished physicians who flourished anterior to the revolution, had received their education in Europe. It is a fact certainly highly honourable and worthy of record, that Harvard College no sooner began to send forth her graduates, than some of them found their way to foreign universities, where they obtained the degree of Doctor of Medicine. In 1642, Samuel Bellingham graduated at the first commencement at Harvard, and shortly afterwards obtained a doctor's degree at Leyden. In 1650, John Glover and Leonard Hoar left the college, and were afterwards honoured with the doctorate abroad, the former at Aberdeen, the latter at Cambridge in England. Hoar afterwards became president of Harvard College. In 1674, Edmund Davie graduated, and subsequently was made an M. D. at Padua. (See the Catalogue of the Graduates of Harvard College.)

As may be supposed, this practice became more and more common, till the period of the revolution; and this, together with the number of foreign physicians of talent and education who emigrated to this country, tended, in no inconsiderable degree, to correct the deficiencies of domestic instruction. The first attempt at establishing a regular system of medical instruction in this country, was not made until a very few years before the revolution; and for this we are indebted to Drs. William Shippen and John Morgan, both natives of Pennsylvania, who projected the plan during the prosecution of their studies abroad. In 1762, Dr. Shippen returned to his native country, and in the year delivered a course of lectures of anatomy to a class of students amounting to twelve in number. These lectures were repeated in 1763 and '64. In the following year Dr. Morgan, who had just returned from Europe, pronounced "A Discourse upon the Institution of Medical Schools in America," before the trustees of the college, in which he proposed a plan for teaching the different branches of medicine, and portrayed with prophetic ardour the blessings which would flow from such a measure. Happily he spoke to a body of men capable of entering into his expanded views; and measures were soon after adopted for forming a medical faculty. Dr. Morgan was appointed professor of the theory and practice of medicine, and Dr. Shippen professor of anatomy and surgery. The other stations were not immediately filled. In 1768, Dr. Adam Kuhn, a pupil of Linnæus, who had just returned to his native country, was chosen professor of botany and materia medica; and in 1769, Dr. Rush, who had just finished his education at Edinburgh, was chosen to the chemical chair. At the same time, Dr. Thomas Bond gave clinical lectures at the Pennsylvania Hospital. Being thus provided with professors on the most important branches of medicine, the school went into complete operation, and the lectures were continued to the year 1775, when they were suspended by the war of the revolution. Dr. Shippen at this time had delivered fourteen courses, and the annual number of students had increased to between thirty and forty. (Eulogium on Dr. William Shippen, by Caspar Wistar, M. D. p. 27, 1818.)

New York soon became emulous of the example set her by Philadelphia, and in 1768 adopted measures for extending similar advantages to medical students. A full medical faculty was regularly organized under the superintendence of the trustees of King's (now Columbia) College, of which Samuel Clossey, M. D. was professor of anatomy, John Jones, M. D. professor of surgery, Peter Middleton, M. D. professor of physiology and pathology, James Smith, M. D. professor of chemistry and materia medica, John V. B. Tennent, M. D. professor of midwifery, and Samuel Bard, M. D. professor of the theory and practice of physic. At the opening of the school, a learned discourse, already noticed, was delivered by Dr. Middleton. A measure so honourable to those immediately concerned in effecting it, and to the city itself, promised not merely to elevate the character of our profession, but to be productive of general good to the community. The fair prospects thus anticipated, were all arrested by the war.

The schools thus started in Philadelphia and New York, were the only ones attempted before the Revolution. The first medical degrees were given by the college of New York. In 1769, the degree of Bachelor in Medicine was conferred upon Samuel Kissam and Robert Tucker. In 1770, the degree of Doctor in Medicine was conferred upon the last of these gentlemen, and in May of the following year, upon the former. In June, 1771, the degree of Doctor in Medicine was conferred on four students, by the Philadelphia college, being the first given by that institution.

With regard to the works that were commonly read and studied, the following is stated by Bartlett: "Though the works of Hippocrates, Galen, Stahl, and others, were not unknown, those of Sydenham, and his followers, were principally studied by our oldest practitioners, till the time of Boerhaave, whose invaluable labours commenced in 1701, which, with the commentaries of Van Swieten; the practical writings of Whytt, Mead, Brooks, and Huxham; the physiology of Haller; the anatomy of Cowper, Kiel, Douglass, Cheselden, Monro, and Winslow; the surgery of Heister, Sharp, Le Dran, and Pott; the midwifery of Smellie and Hunter; and the Materia Medica of Lewis, were in general use at our political separation from the British empire."*

* A Dissertation on the progress of Medical Science in the Commonwealth of Massachusetts. By Josiah Bartlett. Communications of the Med. Soc'y of Massachusetts, vol. 3, p. 240.

Such is a sketch of the state of medicine during our colonial existence. The Revolutionary war succeeded. During that eventful period, our profession stood firm in their country's cause; and the names of Warren,* Mercer,† and Rush,‡ show that they were not idle spectators of the fray. Nothing was done, however, for the advancement of medical science. The newly-formed medical colleges were broken up, and all the energies of the country directed to the attainment of a nation's highest hope and ambition. The revolution accomplished, and an independent government established, a new career was commenced. In common with every thing else, medicine felt the sacred impulse, and during the brief period of our independence, how has the scene changed! Instead of the feeble beginnings of one or two institutions, about thirty medical colleges are now to be found in different parts of our country; every city has its hospitals; a thriving professional literature has sprung up among us, and we can now boast of authors whom we are not ashamed to mention along with those of European birth. What nation ever accomplished so much in an equal space of time, and under equal circumstances?

J. B. Beck.]

Dissertation on the State of Medical Science, from the Termination of the Eighteenth Century to the Present Time.

CHAPTER I.—*Introductory observations—Importance of Comparative Anatomy and Physiology, as extending the foundations of medical science—Misapprehensions involved in the general principles of Hoffmann and Cullen—Improvements recently effected in the physiology of the essential conditions of life in the higher animals—in the physiology of the Nervous System—in other departments of physiology—Vital changes in the fluids, as well as in the solids, must be held to be ultimate facts in physiology and pathology.*

In attempting to give a general view of the most important changes of doctrine and improvements of medical science which have been made since the close of the last century, as well as of the leading facts which have engaged the attention of the profession during that time, we do not hesitate to acknowledge our strong sense of the extent and difficulty of the undertaking, but trust that our remarks will be received with candour and impartiality.

The First Lines of Dr. Cullen and the Treatise on the Blood, &c. by Mr. Hunter, may be held to be the most important systematic works on medical subjects which were published, in Britain, during the latter part of the eighteenth century; and all the additions to medical knowledge, and improvements in the principles of medicine, which have been made since they were published, may be included in such a review of the recent progress of the science.

When we compare the general notions as to medical science which are prevalent at the present day, with those which are recapitulated by Dr. Cullen in the Introduction to the last edition of his First Lines, as holding their place, up to his time, in the schools of medicine, the most important observation that occurs to the mind is the present general, although not always avowed recognition of this principle:—That the phenomena of disease, like all other phenomena of living bodies, belong to a class of facts, and constitute a subject of investigation, altogether distinct from those which are presented by any forms or changes of inanimate matter. Dr. Cullen states that "the Mechanical Philosophy had been applied (soon after the discovery of the circulation) towards explaining the phenomena of the animal economy, and continued till very lately to be the fashionable mode of reasoning on the subject;" and he very properly admits that it must "still in some respects continue to be applied," but adds that "it would be easy to show that it neither could, nor ever can be, applied to any great extent in explaining the animal economy." Now an important step has been already made in the progress of medical science, when this proposition has received the general assent of the profession,—and when the study of Mechanical Philosophy is recommended to the student of medicine, not as one of the foundations of medical science, (with the exception of a few simple applications of its principles in some parts of Physiology,) but simply as an example of successful scientific investigation.

A nearly similar observation may be extended to the study of Chemistry; for although it be true that all vital actions are attended by, and in part dependent on, a series of continual chemical changes, and although a certain knowledge of chemical principles is therefore required of the physiologist, yet the chemical changes of animated nature are as distinct from those which we produce at pleasure in dead matter, as the stimulation by nerves and the contraction of muscles are distinct from any of the principles and powers of mechanics. Excepting in its application to the Materia Medica, the chemistry of dead matter avails little in the science of Medicine; and although little progress has yet been made in the inquiry, it has become obvious that the chemistry of living matter is, in fact, one of the departments of Physiology, the peculiar laws of which must be studied and ascertained in living bodies themselves, and in the products of their vital changes. The chemical part of the changes that take place in respiration, and in the digestion and assimilation of food, has been carefully and successfully investigated of late years; but the result is, that merely chemical principles are equally inadequate for the explanation of those changes, and of their effects on the system, as merely mechanical principles are for the explanation of the movements

* Major General Joseph Warren was born at Roxbury, near Boston, in 1741. He studied medicine and practised his profession at Boston. At the first breaking out of the Revolution, he turned his attention to arms, and was slain at the battle of Bunker Hill, June 17, 1775. See Thatcher's Medical Biography.

† "Hugh Mercer, M. D., a general in the Revolutionary war, was a distinguished physician, who, like Warren, fell in the defence of the liberties of his country. He was a native of Scotland, and educated at Edinburgh. He early emigrated to Virginia, and settled at Fredericksburg, where he practised medicine for several years with great reputation. During the Revolution, he zealously engaged in defence of the liberties of his adopted country, and fell in the battle of Princeton, 1777." Prof. Sewall's Lectures, 1825, p. 60.

‡ Dr. Rush was a member of the Congress of 1776, and one of the signers of the Declaration of Independence.

which, in the economy of the higher animals, are equally essential parts of these functions.

It is farther obvious, that all those functions of living bodies which are now properly distinguished as the *animal* functions, i. e. all those which necessarily imply the intervention of some mental act, can derive no elucidation from anything that is ever seen in the inanimate world; and that, in so far as the science of medicine is dependent on the knowledge of them, it must be built on observations made on the living state of animals exclusively.

Although, therefore, some degree of acquaintance with other natural sciences is properly expected of a physician, yet it is chiefly as an exercise of the understanding that the study of these sciences must be recommended. The direct applications of any parts of the knowledge derived from that study, either in the science or practice of medicine, are very partial; and the cultivation of that knowledge is chiefly desirable, "not for the sake of the fruits, but to be ploughed in as a dressing to the soil."

It remains, therefore, as the only rational foundation of medical science, that we must trust to the careful examination of the structure and functions of living bodies themselves, as existing in health, as altered by injury or disease, and as influenced by remedies. It is by accurate observation and careful generalization of facts confined to this department of nature itself, that the general principles or Laws of Vitality (whether in the state of health or disease) are ultimately to be made out, which will bear the same relation to the science of medicine, as the principles of gravitation, of the inertia of matter, of motion communicated by impulse, &c. bear to mechanical philosophy; or as the laws of heat, of electricity, and of chemical affinity bear to chemistry.

But in order that this may be effectually done, it is now generally admitted that an extension must be given to the inquiry which has not until lately been in the contemplation of most medical inquirers. It is only by tracing the varieties of organization and of vital phenomena throughout the different order of animals, and even in vegetables, that we can expect to be able to ascertain the most general laws of vitality, and distinguish them from the conditions of existence of individual families or genera: it were easy to show that limited and erroneous ideas have originated from the attention of medical inquirers being fixed on the economy either of the human body or of those animals only, which approach the nearest to man; and that the true foundation of medical science must be laid in an extensive knowledge of anatomy and physiology, *human and comparative*. The clear perception of this truth has been gradually impressed on the medical inquirers of the present age, chiefly by the influence of the labours of John Hunter in this country, of Blumenbach in Germany, and of Cuvier in France; and the great, though hitherto unfinished work of Tidemann may be quoted as evidence of the form and extent which have thus been given to medical science. It must, however, be admitted, that in the writings of professed comparative anatomists much talent and ingenuity have been fruitlessly exerted in questions as to the analogies of structure to be traced in the different classes of animals, which have no bearing on strictly physiological or medical inquiries.

In the systematic writings of Hoffmann and Cullen, "the state and affections of the *primary moving powers* of the animal economy," as distinguished from any principles of chemistry or mechanics, were first regarded as the main objects of inquiry in the investigation of diseases; and the proper path of pathological inquiry may be said, therefore, to have been opened by these authors. But it will now be pretty generally admitted, that these moving powers of the animal economy, so long neglected in the older schools of medicine, were erroneously conceived by them. Hoffmann, in a passage which is quoted by Cullen, as giving the best epitome of his doctrines, asserts, "quod solus *Spasmus*, et simplex *Atonia*, æquabilem, libreum, ac proportionatum sanguinis omnisque generis fluidorum motum, quibus excretionum successus et integritas functionum animi et corporis proximè sistitur, turbando et prevertendo, universam vitalem œconomiam subruant et destruant; atque hinc universa Pathologia longe rectius atque facilius *ex vitio motuum microscosmicorum in solidis*, quam ex variis affectionibus vitiosorum humorum, deduci atque explicari possit; adeoque omnis generis ægritudines internæ ad *præternaturales generis nervosi affectiones* sint referendæ." Now this passage plainly implies two propositions, which were maintained by Cullen as well as by Hoffmann, and formed an essential part of the system of both, but which subsequent inquiries have shown to be not only hypothetical, but most probably erroneous,—viz. *first*, that all movements of fluids in the living body depend on the impulse of moving solids; and *secondly*, that all movements of living solids depend essentially on the nervous system.

In opposition to these ideas of the "moving powers of the animal economy," two propositions may be stated as very prevalent opinions, if not generally admitted principles, at the present day:—

1. That, although the principle of *voluntary motion* certainly resides in the Nervous System, yet the supposition of the principle of *all vital motion*, or as some have expressed it, the principle of life itself, being lodged exclusively in the Nervous System, is an unfounded hypothesis; and, 2. That the fluids of living bodies are liable to movements, or variations of movement, peculiar to their living state, but independent of any impulses which they receive from the solids.

The first of these propositions is the general result of the inquiry as to the relation of muscular motion to the nervous system of animals, which was begun in the last age by Haller and Whytt, and continued in the present chiefly by Bichat, Legallois, and Flourens in France, and by Cruickshanks, Brodie, and Wilson Philip, in this country. It has been clearly shown, indeed, that the involuntary motions of the body, and the property of Irritability itself, resident in the muscular fibres, are *liable to much alteration* from causes acting in the Nervous System; but there is not only good evidence against the hypothesis of their *dependence on an influence or energy constantly flowing into the muscles through the nerves*, but no satisfactory evidence that any intervention of

change in a nerve is necessary, to enable a stimulus to act on a muscle.

The second proposition, stated above, is the general result of many observations made on different classes of living beings, and particularly on the movements in the capillary vessels of vertebrated animals, by Haller and by various physiologists and pathologists, chiefly in Germany, since his time. These observations have, perhaps, hitherto attracted less attention in this country than they deserved; but many facts might be stated to show, that no powers of contraction which can be either attributed to the smaller vessels of animals from what is known of the larger, or detected by microscopical examination of the small vessels themselves, will suffice to explain those fundamental changes, as to the distribution of the blood through the capillary vessels of the body, which led both Hoffmann and Cullen to look to a disordered action of these vessels as the true origin of the most important diseases.

It is easy to perceive that these alterations in the views of physiologists as to the "primary moving powers of the animal economy," must necessarily involve a most material change in any speculations which we can entertain as to the fundamental nature of diseased actions.

It may be added that another principle, which held an important place in Pathology even in the writings of Cullen, and likewise, in a somewhat different form, in those of Hunter, has since been very generally and properly abandoned. This is the principle of the Autocrateia, or Vis Naturæ Medicatrix, not indeed regarded by Cullen as it had been by Stahl, as an attribute of the human mind, but still held out as a power of the animal system, to which changes occurring in the course of disease might be reasonably referred, and by which they might be explained.

It is perfectly true that the greater number of diseased actions are essentially temporary in their nature, and that there are various and wonderful provisions of nature for avoiding and repairing injuries, to which the body is liable; but unless we substitute *final* for *physical* causes,—the "id propter quod" for the "id ex quo,"—the knowledge of this general fact gives no assistance in tracing the laws of the animal economy, to which either these or other changes, occurring in disease, are to be ascribed. The critical termination or gradual decline of idiopathic fever, the resolution of inflammation, the exudation and organization of lymph on inflamed surfaces, the processes of suppuration and of sloughing, the function of healthy absorption, and the increase of absorption from pressure, are all examples of changes which frequently, although not uniformly, tend to the preservation of life; but it is quite certain that these different processes depend on very different principles or laws of the animal economy; and the knowledge of the fact, that these different laws are wisely designed for the preservation of life, gives no assistance in the inquiry as to the nature of the laws themselves, which is the inquiry that the pathologist has to pursue.

It must be owned, however, that although, in these different aspects, we may hope that medicine is cultivated at present on sounder principles than fifty years ago, yet as there has been no strictly systematic writer of high repute since the time of Cullen, so the attention of medical men has been seldom fixed on these first principles of the science; and their efforts have been directed chiefly to the elucidation of subordinate departments, capable of more direct practical application, and demanding a more detailed notice.

I. The first of the more special improvements which may be noticed as having been effected within the last forty years is, the elucidation of those fundamental questions in Physiology which bear most directly on Pathology, viz. those which illustrate the causes of *sudden or violent death*; and the more precise information which we now possess on these points may be traced, in a great measure, to the labours of Bichat, who fixed the attention of physiologists on the essential distinction of the Organic and the animal life of all the more perfect animals, and on the importance of the function of Respiration, as the closest and most permanent bond of union between the two. This intermediate character may likewise be assigned to digestion, and to all the functions necessary to the life of animals which are dependent on movements excited, directly or indirectly, by *sensation*, as distinguished from those strictly organic functions in which no mental act is concerned.

The ideas of Bichat of the three modes of sudden death, that beginning at the brain, at the lungs, and at the heart, were in some respects incomplete. He was not aware that by certain kinds of injury of the brain or spinal cord, death may be produced, not through the intervention of failure of respiration, (as in the case of what is strictly called death by Coma,) but by a sedative impression suddenly communicated to the heart, and therefore strictly in the way of Syncope; he did not seize the right view of the manner in which the circulation is brought to a stand when the access of air to the lungs is in any way obstructed, and was so far inaccurate in his notion of death by Asphyxia; he had not studied, at the time of his death, the action of Poisons on the animal economy, so as to be aware of the illustrations of his own principles which these afford; and he had made little application of his views as to violent death to the more complex changes which constitute disease. But these deficiencies have been since supplied. The experiments of Legallois and of Dr. Wilson Philip, and the clinical observations of Brodie, Travers, and others, have sufficiently illustrated the direct effect of violent concussion, or shock, in whatever manner produced, on the heart and other organs of circulation. The dependence of the death by asphyxia, not on the loss of power in the heart, but on the stagnation of blood in the lungs, and failure in the supply of blood to the left side of the heart, has been satisfactorily established by the experiments of Dr. Williams of Liverpool, and Dr. Kay of Manchester. The different modes in which death is produced by Poisons (which are the more important as they are the facts in nature most analogous to the changes which constitute the most deadly diseases) have been clearly pointed out by Sir B. Brodie, and amply illustrated by the researches of Orfila and Dr. Christison. What is more important in a pathological view is the peculiar depressing influence on the vital actions of

the sanguiferous system, which many poisons, belonging to different classes, (e. g. opium and arsenic,) are shown to exert;—which in the case of some of the mineral and vegetable poisons, as arsenic or tartar-emetic in large doses, tobacco, digitalis, hydrocyanic acid, is the immediate cause of death;—and which is the most striking part of the effect produced by animal poisons, such as that of a venomous serpent or the most virulent contagious effluvia. It may be added that the different modes in which excessive Cold and excessive Heat, and Electricity or lightning, produce death, have been sufficiently elucidated by experiments of Chossat, Brodie, and others, and by cases recorded by many practical observers; and that the different effects of violent Hemorrhages have been carefully investigated by Dr. Marshall Hall, Dr. Blundell, and others.

From all these observations it is now fully understood that the ultimate effect of all causes of sudden death may always be referred to their arresting, in ways which we can distinctly specify, the flow of arterial blood throughout the body; which is, in all cases, the essential condition of all its vital actions, although in different tribes of animals, and in different states of the same, the degree of rapidity of the requisite supply of this blood is remarkably various.

It is also distinctly understood that, in all cases of sudden death in the higher animals, most nearly approaching to man, this essential condition fails from one or other of two general causes, either because the vital agency of the powers moving the blood is directly depressed or suspended, or because the action of the air on the blood is obstructed, and the blood therefore stagnates in the lungs;—that the vital action of the sanguiferous system may be suspended in two ways, either by various agents, chiefly acting through the nervous system, which impress it in the manner of a Concussion or Shock, or after the manner of one of the virulent poisons abovementioned, which act nearly as a concussion does; or by abstraction, sudden or gradual, of the vital stimulus;—and lastly, that the action of the air on the blood may be obstructed also in two ways, either by such injury of the Nervous System as produces insensibility or Coma, and ultimately arrests the mechanical actions of respiration, which depend on sensation; or by direct impediment to the admission of air to the Lungs, arresting the respiration more directly or producing Asphyxia.

Although it is only in a few cases of disease that life is extinguished in so simple a manner as in any of these instances of violent death, yet it is plain that the scientific treatment of all diseases must be very much guided by a clear perception of the landmarks which are presented to the careful observer, by the study of these simplest cases in pathology.

II. The next important addition to the science of medicine has been furnished by the labours of those physiologists who have done so much within the last twenty years to determine the different purposes which are served by the different parts of the Nervous system. The general result of these inquiries may be thus stated: that the very different offices to which the nervous system has long been known to minister, in different parts of the body, are not determined, as was formerly suspected, by the various organization of the parts, but by the various endowments of different portions of the nervous matter itself, in relation to those mental acts of which they are the seat and the instrument.

The dissections, experiments, and clinical observations of Sir Charles Bell, Mr. Shaw, and Mr. Mayo, in this country, of Magendie, Serres, Desmoulins, and Flourens in France, and of Rolando and Bellingeri in Italy, [and of Valentin, J. Müller, and others, in Germany,] are the most important of those by which it has been ascertained, that the conditions which are necessary to all the sensations, and to the excitement of all muscular motions by mental acts, are confined to those nerves, and to those portions of the spinal cord, and its immediate prolongations within the cranium, to which we now give, without difficulty, the names of sensitive and motor respectively. We can specify those portions of this Cerebro-Spinal Axis, on which each of the sensations peculiarly depends; we can point out the use of parts within the cranium, in immediate connection with the Cerebro-Spinal Axis, by which voluntary or instinctive motion in different directions is determined; we can form some idea of the parts of the nervous system, and of the peculiarities of structure, by which the influence of mental acts over the involuntary motions and other organic functions, is maintained; and we can show that the brain and cerebellum are not essential to the performance of the functions of the spinal cord and nerves; that they are neither required for sensation, nor for those instinctive actions which are most intimately linked with sensations, but are superimposed on those organs with the intention of combining sensation and instinctive action with the higher attributes of mind. These parts of the nervous system furnish the conditions, not of sense or motion, but of intellect, of desires, and moral feelings; they are required, not in order that sensations may be felt, but that they may be remembered and availed of for that purpose,—not in order that volitions may act as stimuli on muscles, but that they may be so excited, and so succeed one another, as to produce regular and useful voluntary actions, under the guidance of desires, and of judgment and experience, as distinguished from blind instinct.

[The views of Dr. Marshall Hall, in regard to the true spinal system of nerves, have shed great light on many circumstances connected with the nervous system, which were previously regarded as anomalous. Dr. Hall divides all the nerves into 1. the *cerebral*, or the sentient and voluntary; 2. the *true spinal* or excito-motory; and 3. the *ganglionic*, or the nutrient and secretory. He believes, that a peculiar set of nerves constitute, with the true spinal marrow, or the gray matter as their axis, the second division; the *excitor* nerves pursuing their course principally from internal surfaces, characterized by peculiar excitabilities, to the true medulla oblongata and medulla spinalis; and the *motor* nerves pursuing a reflex course from the medulla to the muscles, having peculiar actions concerned in ingestion and egestion. The views of Dr. Hall on the excito-motory function have been embraced by J. Mül-

ler, Grainger, Carpenter and most observers, and have been extensively applied to the elucidation of spasmodic diseases more especially; some of which are induced by causes seated in the spinal marrow, or at the centre, whilst others are caused by excentric irritation, or in a reflex manner.]

So far the different endowments of the different parts of the nervous system may be held to have been determined by observation and experiment; and if we decline to enter farther into the speculations of phrenologists (which have attracted so much attention of late years), as to the connection of the individual parts of the brain with the different intellectual powers, or with the exercise of these powers on particular objects of thought, it is not because we regard the general principle of those speculations as unphilosophical, but simply because they are founded on a kind of observations which is open to various sources of fallacy, and derive little or no support either from experiments on animals or pathological observations on the human body, and appear, therefore, to be built on insufficient evidence.

The knowledge of the endowments of the different parts of the nervous system, so far as it has been hitherto attained, is a great and important step in physiology; it is of importance in the diagnosis of many of the diseases in which the nervous system is concerned, as fixing the precise seat of these diseases; and it enables us to explain the great diversity of symptoms, which may result, in different cases, from apparently similar lesions of the brain and cerebellum, and so to surmount what was formerly a serious difficulty in pathology;* but it is susceptible only of occasional and partial application in the practice of medicine, simply on this account,—that practical questions as to the treatment of diseases, especially of different diseases of the same texture, must always turn much more on their nature than on their seat.

III. Many other improvements in Physiology have been effected since the close of the last century, on which it were out of place to dwell here, because they are hitherto susceptible of still more partial application either in pathology or practice; but which must not be omitted in any general account of the progress of medical science. The chemical analysis of the Blood has been carried to a high point of perfection; and the varieties in the proportion of its constituents in different circumstances, the essential differences of venous and arterial blood, the essential nature of the process of coagulation, and the circumstances by which it may be accelerated, retarded, or prevented; the alterations effected by inflammation in the proportion of the fibrine, and in the property of coagulation; the organization of the fibrine which exudes from inflamed surfaces; and the proofs resulting from these last facts, of the existence of strictly vital properties in the blood as well as in the solids of the body, are all points that have been elucidated by numerous experimental inquirers, following the path which had been opened by Hunter and Hewson; and among these Bostock, Berzelius, Marcet, Hey, Thackrah, Davy, Prévost and Dumas, Le Canu, Denis, Gendrin, Schroeder Van der Kolk, Babington, and Prater, [Andral and Gavarret, Mandl, Donné, Wagner, Gulliver, and Wharton Jones,] may be particularly mentioned.

The nature of muscular contraction in general has been more fully investigated by Prevost and Dumas than by any previous physiologists; and the question, repeatedly agitated, whether there be any change of volume in the fibres at the time of their contraction, has been resolved in the negative by these authors, by Mayo, and others. [The whole subject of the histology and physiology of the muscles, has been ably investigated by Bowman, Gerber, Skey, Martin Barry, Bishop, and others.] The vital actions of the heart have been particularly studied, and the use of its valves, and of the peculiar convoluted structure of its muscular fibres, if not fully ascertained, have been much elucidated by the dissections and experiments of Gerdy, of the late Dr. Duncan, of Williams of Liverpool, Corrigan, Hope, Carlile, [Pennock and Moore, Cruveilhier, Williams of London,] &c., as well as by the clinical observations of Laennec, and the correction of some of his conclusions by Professor Turner and others. The nature of the vital power which can be ascertained to exist in arteries has been satisfactorily determined by the experiments of Parry, of Wedemeyer, and of Poiseuille. The auxiliary forces which contribute to the flow of blood along the veins, and particularly the effect produced on its movement there by acts of inspiration and expiration, have been partially indicated by Carson, and more clearly pointed out by Magendie and Sir D. Barry. And the flow of blood in the capillary vessels, under various circumstances, has been carefully examined, and subjected to comparison with the movement of fluids in the lower classes of animals and in vegetables, by numerous observers, of whom the most deserving of notice are Thomson, Hastings, Black, and Marshall Hall in this country; DuTrochet, [Magendie,] Leuret, and Gendrin in France; and Schultze, Döllinger, [Wagner, J. Müller,] and Kaltenbrunner, in Germany.

On the whole, it may be stated that the investigation of the powers by which columns of blood are moved through the larger vessels of the human body, seems to be nearly complete; but farther inquiries are still demanded, to determine the nature and estimate the efficacy of the powers, by which the movement of the blood is affected and its distribution regulated, after it has been diffused throughout the innumerable ramifications of the capillaries; and this deficiency is the more important, as it is clearly in the alteration of vital actions of which the capillaries are the seat, that all the most formidable diseases originate. The prin-

* It is due to the memory of the late Dr. Gordon of Edinburgh, to state, that as early as 1813 he had inferred, from pathological facts already known, that the brain and cerebellum are not concerned in sensation nor in certain voluntary actions. He thought that palsy, in any of its forms, when produced by disease within the cranium, higher than the medulla oblongata, might be referable, not to loss of the essential conditions of sense or of voluntary power, but to what he called a "noxious influence," transmitted in some such cases, and not in others, from the seat of the disease to the nerves of the parts affected. Of the share which the medulla oblongata and spinal cord may have in these functions he spoke doubtfully, as the state of our information at that time required. The facts which he had collected on this subject are contained in a paper in the twenty-fourth volume of the Edinburgh Review.

ciple of *Endosmose* and *Exosmose*, illustrated by the experiments of Dutrochet and others, certainly does not develop the sole agent of vital movement in the capillaries; but it exhibits movements, even in inanimate fluids, which may be said to bear the same relation to the chemical actions of these fluids on one another, as certain of the movements of living fluids bear to the vital changes to which they are destined.

In regard to the functions of Nutrition, Secretion, and Excretion, to which the circulation is subservient, perhaps the most important information, lately obtained, is of a negative character. Notwithstanding the opposite opinion of some eminent physiologists, it may be stated as the general belief, and as a fair inference from a review of the different departments of living beings, as well as from experiments and observations on the higher animals, that these processes are independent of any influence or energy necessarily derived from the nervous system.*

It may also be laid down as a principle established, chiefly by the observations of Cuvier, that the differences among the products formed from the blood in the living body, great and numerous as they are, cannot be explained by the differences of organization, or by any peculiarities of the vascular arrangements, of the parts where they show themselves.

Several circumstances, in regard to the intimate structure of organized substances, both animal and vegetable, have lately attracted much and deserved attention, as clearly distinguishing them from any products of the chemical attractions which subsist among the particles of dead matter. The most important are, the very general tendency of substances which are the result of vital action, to take the form of globules, or rather of *cells*, in which a containing cyst and a contained matter are usually discernible; the total absence of crystalline arrangement in the living and growing parts of these textures; and the fact, that the particles of earthy and saline matters which enter into the composition of organized substances, however small their proportion to the whole, are never aggregated together, but are equally diffused through the whole mass, and retain the original form and dimensions, even after the whole of the strictly animal or vegetable matter has been burnt out. These facts, established by Dr. Prout in this country, and by Milne Edwards, Tiedemann, Raspail, and others abroad, clearly indicate that the attractions and repulsions which subsist among the elements constituting organized bodies, at the period of their formation by living action, are essentially different from those by which the same elements are actuated in other circumstances; and establish the existence of a distinct set of laws, regulating their combinations in living structures, to which the general title of *Vital Affinities* has been happily applied. [A comprehensive description of the opinions of many recent histologists on *cells* and *cell-life* is given by Dr. Carpenter in the *Brit. and Foreign Med. Review* for Jan. 1843, p. 249.]

As the analysis of the blood has been improved, so many of the proximate principles which go to the composition of animal substances have been detected in it, or procured from it by very simple means, that the processes by which the solids of the living body are nourished, or the prepared fluids furnished, have been gradually more and more regarded as nearly approaching to simple transudation, or, as it has been appropriately termed, Chemical Filtration. And since the process of assimilation or sanguification, by which foreign matters are added to the blood either in the adult or fœtal state, has been minutely traced, so much contrivance for the gradual formation of the blood has been developed, that we are the less surprised to find so many proofs of its very heterogeneous nature when it comes to the extremities of the arteries, and is applied to the purposes of nutrition and secretion; and of the apparent simplicity of these processes themselves.

One principle, at least, may be held to be nearly established on this subject, that the materials of the different *Excretions* already exist in the compound blood, and are only evolved or separated, not formed from the blood, at those organs at which they respectively appear. This is certain as to the urine, from the result of the experiments of Prevost and Dumas, and of pathological observations by Dr. Christison and Dr. Bostock in the human body, from which it appears that when the kidneys are extirpated or more gradually obstructed, and rendered unfit for their office, the urea, or peculiar matter of the urine, shows itself in the blood. As the peculiar matter of bile appears now to have been detected, even in healthy blood, and as there are undoubtedly cases of intense jaundice, in which the bile-ducts appear on dissection pervious and *empty*, even throughout the substance of the liver,—where there is therefore no reason to suppose that any secretion of bile had taken place,—we have good grounds for extending the same conclusion to the liver, as we have stated in regard to the kidneys. And there is still less difficulty in extending it to the excretions by the skin and the lungs. We may consider the function of excretion, therefore, (which is a concomitant of vital action in all living beings without exception,) as having its origin in all parts of vital action in all living bodies, or more probably *in the nourishing fluid* which penetrates and vivifies them all; and as the necessary complement of the process of assimilation, by which extraneous substances are incorporated with organized matter.

The important discoveries as to the nature of the corresponding process of Absorption, which have been made of late years by Magendie, Ségalas, Fodéré, Meyer, Tiedemann, [Sir D.] Barry, and many others, (when duly compared with the comments of other physiologists,) may be thus expressed,—That although the set of vessels described for a century past by the name of absorb-

* It is perfectly in conformity with this doctrine to state, that the nutrition of certain parts, as of voluntary muscles and the organs of sense, and that the secretions of other parts, especially of mucous membranes, are *habitually excited* by voluntary motions and by sensations, and therefore become deficient when certain nerves of voluntary motion or of sensation, are injured or palsied. This principle seems to furnish the true key to the facts observed in numerous recent experiments on animals, by Brodie, Wilson Philip, Swan, Breschet, Leuret and Lassaigne, Magendie, and others, as to perversion of secretion and nutrition from section, particularly of the fifth and eighth nerves. And the same principle may be applied to various important phenomena in disease.

ents are really destined to the office of absorption, and their structure, in various ways, is peculiarly adapted to it, yet it is not through them, nor through any one set of vessels exclusively, that the absorption of extra-vascular substances into the circulating mass is effected; that a function precisely similar is executed in many living beings, without any set of vessels being appropriated to it; and that the absorption of extra-vascular matters in the higher animals must be ascribed, therefore, in the last result, to peculiar relations subsisting, in the living state, between those matters and the circulating blood, rather than to the peculiar nature or forms of the vessels which are the organs of absorption; and, accordingly, that the degree of absorption is very much influenced by two circumstances in the condition of the circulation at the part where any such extraneous matters may lie,—viz. by the fulness of the vessels, and by the rapidity of the current at that part; being always diminished when the vessels are much distended, and likewise when the flow along these vessels is much retarded or suspended, as by the removal of atmospheric pressure from any portion of the surface of the body.

Another principle in regard to absorption in the more perfect animals, of complex structure, which recent inquiries have illustrated, and which has been already briefly noticed, as probably of fundamental importance, viz. the careful provision which nature has made for the very *gradual intermixture* of any foreign matter, thus introduced, with the nourishing fluid of the body receiving it. Thus, when extraneous matter is received into the primæ viæ, it is not only acted on by the fluids there provided for its reception, and part of it rejected, but the absorption of what is capable of assimilation is divided between two sets of vessels; what is taken up by the veins is carried to the liver, and certain combinations of the elements contained in it are there expelled;—what is taken up by the lacteals is mixed with certain elements of the blood in the absorbent vessels, and particularly in the mesenteric glands; and both portions are carried through the capillaries of the lungs,—where certain matters are evolved from them, and at least one important element added to them,—and are subjected to thorough agitation and intermixture on both sides of the heart, before they are admitted into the arteries, in a condition fit for the purpose of nutrition.

That these arrangements, and others which have a similar effect in the lower animals, are intended to secure the very gradual intermixture and incorporation of fresh nourishment with the blood, we shall be prepared to admit when we remember, that throughout all the classes of organized beings, and in all periods of their independent existence, the assimilation of the crude nourishment, taken in from the external world, is always effected by means of organized matter already existing in each living structure itself; and farther, that in the case of animals at least, the greater part of the ingesta, which are subservient to nutrition, are themselves organized substances, the products of vital action in some of the lower orders of living beings, and the assimilation of which may therefore be said to have commenced in these lower orders of the animated creation. From such facts, it is obvious that there must be contrivances, in all living beings, for the fulfilment of those still mysterious laws and conditions, by which the chemical changes effected by them on the surrounding elements are regulated and controlled; and among these contrivances, the arrangements of the different absorbent vessels and of the excreting organs must evidently be ranked.

The chemical nature of the changes which take place in the air, and in the blood, or nourishing fluid of all living structures, in respiration, has been often and carefully investigated since the time of Black, Priestley, and Lavoisier, especially by Ellis, by Allen, and Pepys, and more lately by Edwards, Dulong, [Gmelin, Tiedemann, Mitscherlich, Liebig,] and Collard de Martigny. The general result is, that the absorption of oxygen and the evolution of water and carbonic acid are the essential changes; but that the products thus evolved are the result, not of a simply chemical action at the lungs or corresponding organs themselves, but of the vital actions throughout the system, by which the blood acquires the venous character before it reaches the lungs. The adaptation of arterial blood to the maintenance of vital action in general, and of circulation in particular, seems to be one of the primary laws or conditions of vitality, for which it is in vain to look for an explanation, and the mode of operation of which is illustrated by what has been already said of the nature of death by asphyxia.

The questions, whether the maintenance of the heat of living animals is satisfactorily explained by the strictly chemical changes that take place in the body, and especially at the lungs, and how far it is dependent on any action of nerves, have been prosecuted with great zeal, since the time of Black, Crawford, and Lavoisier, by Sir B. Brodie, Dr. Davy, Legallois, Hales, Drs. Wilson Philip and Hastings, Chossat, Edwards, Dulong, and Despretz, [Liebig,] and others. The general conclusion is in favour of the sufficiency of the chemical changes to explain it, and of the influence of that particular change on which the evolution of carbonic acid depends, in elevating the temperature of animals; and there is, perhaps, no case in physiology to which the maxim, "Frustra fit per plura quod potest fieri per pauciora," is more fairly applicable: but two points have been likewise ascertained, which were not in the view of the first speculators on this subject, viz. 1. That the chemical changes on which the temperature of the living body depends, cannot be confined to the lungs, nor to the formation of carbonic acid in the body; and, 2. That these changes are remarkably liable to influence from causes, and especially from injuries, affecting the nervous system.

The power which living animals possess of maintaining a temperature lower than that of the surrounding air, has been shown by De la Roche and Berger, and by Edwards, to depend merely on the increased evaporation from them, and therefore on a simply chemical principle.

In regard to the function of digestion, the most important additions to our knowledge have been made by Drs. Marcet, Prout, Wilson Philip, and Sir B. Brodie, in this country, by Tiedemann and Gmelin, in Germany, and by Magendie, Londe,

and Leuret and Lassaigne, in France; and of these the following chiefly demand attention:— 1. The division of alimentary matters into the great families of albuminous, saccharine, and oily; and the necessity of mixture of at least two of them for the nourishment of man and of the most analogous animals, — (another fact which shows how much hitherto unexplained contrivances must be included under the term assimilation of food.) 2. The secretion of an acid solvent liquor, containing the muriatic acid, in the stomach, subsequent to the reception of aliment, and regulated to a certain degree in its quantity and strength by the nature of the aliment received. 3. The great diminution of this secretion, usually caused by section of the par vagum, particularly in the neck, in circumstances when we know that the sensations of the stomach and of the lungs are very much perverted. 4. The appearance of matter possessing in some degree the characters of albumen, in the chyme thus formed, even in the stomach, and the increasing proportion of this matter in the upper part of the bowels, and in the contents of the lacteals and thoracic duct. 5. The formation of globules, similar to those of the blood, in this albuminous matter, likewise commencing in the stomach. 6. The gradual combination of the acid and oil of the chyme with the alkali of the bile, in the course of the small intestines, and the gradually increasing proportion of the peculiar animal and excretory matter of the bile, in tracing the contents of the intestines downwards, as the acid and the albuminous matters disappear. 7. The albuminous and slightly acid nature of the pancreatic juice, its greater abundance in herbivorous animals, and the corresponding fact, that in the human body vegetable food is chiefly acted on after it has passed the pylorus. 8. The reappearance of acidity at the cœcum, and probably renewal of a certain degree of the digestive process in the great intestines.

[The observations of Dr. Beaumont, of the United States Army, on an individual having a fistulous opening into the stomach, have confirmed many of these positions; and thrown great light on the phenomena of digestion. It would seem, from the experiments of Eberle and Schwann, that a nitrogenized substance is thrown off from the stomach, which the former terms *pepsin*, and which is an active agent in digestion. The agency of this pepsin is regarded by Liebig to be similar to that of *diastase*, in the germination of seeds. Both are bodies in a state of transformation or decomposition; — the latter effecting the solution of the starch—that is, its conversion into sugar; and the former, the conversion of alimentary matter into chyme. The prevalent belief amongst physiologists and chemists is, that pepsin, by inducing a new arrangement of the elementary particles or atoms of the alimentary matter, disposes it to dissolve in the gastric acids. Liebig does not believe that the digestive process is a simple solution, but a species of fermentation, not identical, however, with any of the known processes of fermentation occurring in organic matters out of the body.]

Besides the great discovery of the various endowments of different parts of the nervous system, some farther improvements have been effected in that part of physiology which treats of the strictly animal functions—sensation, thought, and voluntary motion. Various facts as to the conditions requisite for the exercise of the senses, and particularly of the sense of sight, have been ascertained; and the general views of physiologists as to the information which the senses convey, and the mental processes which they excite, have become, at least in this country, more scientific and precise.

Perhaps the most important proposition which can be stated in this part of the subject, is one which has been best illustrated by Dr. Reid and the other Scotch metaphysicians, — that many of the mental acts, which are naturally and uniformly excited by the exercise of the senses, bear no resemblance whatever to the sensations from which they originate; that not only the general ideas which arise in the mind in consequence of impressions from without, (such as time, space, number, power, &c.) are wholly unlike any thing which was ever presented to our senses, but the notions which we form of the qualities of the objects of sense themselves, (such as hardness, softness, extension, motion,&c.) bear no resemblance to the sensations which lead us to form them. Our ideas, therefore, are not, as some philosophers have supposed, merely "transformed sensations;" nor does the external world itself appear to us as the "express image of our sensations;" and the true source of much of our knowledge is, not in the mere intimations of sense, but in the *judgments* which by the constitution of our nature *we intuitively form*, in consequence of receiving these intimations. (See Stewart's Philosophical Essays, "On Mr. Locke's Account of the Origin of our knowledge.")

When this principle of intuition, which must necessarily be admitted as one source of the information acquired through the senses, is duly considered, it will appear that we have no means, *à priori*, of judging what is the kind and extent of information, as to the qualities of external things, which any sense may be capable of communicating, to man or to other animals; and it is still doubtful, whether or not many reported cases of alleged transference of the higher or peculiar senses from one part of the system to another, are referable only to this general principle.

At all events, it is obvious that as we necessarily include under the term mental acts many phenomena which are neither included in sense, nor logically deducible from the intimations of sense, the study of these mental acts, as we feel them in ourselves, and as we judge from their results that they are felt by others, (a study which on many accounts demands the attention of the physician,) must be prosecuted quite separately from that either of the sensations or motions of any living beings; and provided that the attention be fixed on matters of fact, and all useless controversies be avoided, this study may be prosecuted with more advantage in the writings of metaphysicians than of mere physiologists. In this view, the treatises of Dr. Abercrombie, on the Intellectual and Moral Powers, are peculiarly valuable, and perhaps the view there given of our mental constitution may admit, for the sake of the medical student, of still further abridgement.

Lastly, in enumerating the additions which physiology has received since the end of the last century, we must not omit the numerous observations which have been made on the necessary conditions of the function of Generation, and on the mode of life and development of the fœtus. These observations have been made chiefly on different classes of the lower animals; and the varieties of this function in the different classes, and the conclusions to be drawn from the study of these, in fixing the essential conditions of the function, have been admirably stated by Cuvier.

The ovum of some of the mammalia has been detected, first by Bäer, in the Graafian vesicle of the ovary; the nature of the changes, at the ovary, which precede and follow the escape of the ovum, and the fallacies attending the appearance of the corpus luteum, have been elucidated (perhaps not yet completely determined) by Sir Everard Home, Magendie, and others; the existence of animalculæ in the prolific male semen has been confirmed by Magendie, and Prevost and Dumas; the necessity of the actual contact of the male semen with the ovum that descends from the ovary, has been put almost beyond dispute by the experiments of Drs. Haighton and Blundell; while the ascent of the seminal fluid in ordinary circumstances to the ovaria themselves has been disproved, both by their experiments and by the observations of Prevost and Dumas. [Still there appears to be but little doubt that the ovum is fecundated in the ovary.]

The changes produced in the uterus by conception, the nature of the connection between the ovum and uterus, and the manner in which the ovum is nourished both before and after the formation of the placenta, have been subjected to new and careful examination, chiefly by Breschet and Velpeau in France, and Dr. Lee in this country. In reference to the general principles of physiology, the most important proposition that has been stated on this subject is that which appears to be nearly established by this last author,—that there is not only no vascular connection between the mother and the fœtus, but none, or next to none between the uterine vessels and the placenta; and, therefore, that there is no force, acting in the way of *propulsion*, which will explain the application of portions of the maternal blood to the nourishment of the fœtus; while at the same time the experiments of Magendie and others have proved, that any substance which may be circulating in the blood of the mother finds ready access to that of the fœtus, but that there is little or no transference of fluids in the opposite direction.

The numerous and careful observations which have been made on the development of the fœtus in its earlier stages, in different classes of animals, by Pander, Wolff, Rathke, Bäer, Prevost and Dumas, [Bischoff, Henle, Martin Barry, Krause, Wagner, Valentin, Purkinje, T. Wharton Jones,] and other, chiefly German physiologists, have sufficiently established, although in opposition to the opinion of Haller, the general doctrine of the Epigenesis, or growth by the *formation* of parts out of the fluids of the ovum, as opposed to that of the Evolution, or growth by the *extension* of parts; and the gradual development of the different organs and textures, the bones, the vascular system, the nervous system, &c., have been minutely traced by Soemmering, Meckel, Tiedemann, Serres, Allen Thomson, and many others. [See an interesting report on the ovum of man and the mammifera, before and after fecundation, by T. Wharton Jones, in *Brit. and For. Med. Rev.* Oct. 1843, p. 513.] The peculiarities of the blood of the fœtus have also been examined; and the curious discoveries of Sir Astley Cooper and Dr. Lee, of the formation of albuminous matter in the thymus gland, and in the liver, of the fœtus, have distinctly shown that here, as well as in the adult, there are contrivances adapted to the general object of Assimilation, the particular intention of which is still mysterious.

The knowledge of the essential nature of the changes, occurring at birth, by which life, previously maintained by organic functions only, is placed in dependence on the sensations of the new being, and so rendered truly animal and independent of the mother, is necessarily dependent on that correct exposition of the essential conditions of life in the adult, to which we have already adverted. The changes in the state of the circulating system, and of the lungs, consequent on birth, have been examined and accurately described by Chaussier and various other authors, particularly with a view to important questions in medical jurisprudence. And those peculiarities of the vitality of the very young warm-blooded animal, in which it approaches to that of the cold-blooded, especially its power of resisting the privation of the natural stimuli of heat and oxygen, have been particularly remarked by Edwards.

Various facts, of great importance as illustrating both the influence of hereditary constitution and of the habits of parents, and also that of climate, air, exercise, diet, and mode of life, on the growth, the healthy functions, and the diseases of the human body, have been ascertained and recorded by different practical authors; the distinctions of the different races of men now inhabiting the earth have been carefully observed by Blumenbach, Lawrence, Prichard, Desmoulins, Mayo, and others; and the peculiarity of some of these races as to liability to, or exemption from, different kinds of disease have been to a certain degree investigated by various authors, since the time of Rush, in America, and by Drs. Fergusson, Johnson, Marshall, and others, who have had opportunities, in the British service, of making such inquiries in different regions of the globe.

In the present state of Physiology, perhaps the most important inference that can be drawn from this hasty survey of the recent additions to the science is that of the extent which must be given to the idea of Vital Action, beyond what can be included in, or explained by, the Vital Motions of living solids. It is true, indeed, as stated by Cullen, that the "primary moving powers of the animal economy" (by which he understood the vital powers of the moving *solids*) must be more or less concerned in all the changes which take place in the healthy body, and in all the deviations from these which constitute disease; but they are only a part, and frequently not the most fundamental part, of these changes. It is probable that there may be movements in the nervous system, corresponding to all the changes, mental or bodily,

which are connected by nature with its living condition; but they are movements which elude our senses; and we must be content to know the changes that take place in the nervous system itself, only by their effects on the mind on one hand, or on the body on the other. As to the changes in the *fluids* of the body which are essential to the life of the solids, it seems certain that even the motions of the fluids in the capillaries, and still more that the peculiar chemical actions to which they are there subservient, cannot be explained either by the ordinary laws of chemistry, or by any modifications of the impulse communicated to them from the solids; and, therefore, that there must be certain Vital Affinities, and Vital Attractions and Repulsions, in which the fluids as well as solids must participate, and on which all vital phenomena are essentially dependent.

When Mr. Knight stated, as the result of a laborious inquiry in vegetable physiology, that the vital power of generating new wood does not reside either in the outer layer of the alburnum or in the inner layer of the bark, but "*in a fluid which pervades the vessels of both*," he stated a principle which is equally applicable to the whole economy of animals; and under which must necessarily be included the most important of those Laws of Vital Action, which it still remains for physiologists to develop. And as we must take the fluids, and the changes proper to the fluids, into account in all attempts at explanation of physiological phenomena, so we must be prepared to admit a Humoral Pathology as essential to the explanation of all the more important phenomena of disease; but this must be a pathology founded on observed changes, not simply of the mechanical or chemical condition, but of the strictly *vital properties* of the fluids, and especially of the blood.

CHAPTER II.—*Recent additions to our knowledge of the external causes of diseases—Of those which operate generally, and of those which are of local and temporary operation only—Additions to our knowledge of the nature and treatment of acute diseases—Of inflammatory diseases — Of their consequences, and varieties—Of idiopathic fever—Its essential distinctions from inflammation—Its varieties and complications — Of other epidemic diseases — Their different modes of fatal termination, and the adaptation of remedies to them.*

Next to the additions which have been made since the end of the last century to our knowledge of physiology, we may place the numerous important observations by which our information as to the *external causes* of disease has been rendered more extensive and more precise. These observations, and the inferences from them, demand the more attention from physicians, that they necessarily involve a kind of evidence essentially different from that on which we proceed in other medical inquiries. And if we durst hope that the progress of human wisdom and virtue would bear any proportion to that of human knowledge, we might expect that the lessons to be drawn from these inquiries would prove of even greater importance to the future happiness of mankind than any which we can gather from the history or treatment of diseases.

These inquiries have in some instances been prosecuted by individuals in civil life; but the opportunities of making decisive observations on some of the causes of disease which occur in the experience of medical officers of fleets and armies, —who are perfectly informed of the whole circumstances of the organized bodies of men under their observation, and often see these circumstances suddenly altered, or have even the power of altering them at pleasure,—are much superior to those which other practitioners enjoy; and the peculiar value of such observations has never been so well understood as during the last war.

In stating the general result of recent observations on the causes of diseases, it is well to keep in view, *first*, the old and well-known distinction of predisponent and exciting causes, and, *secondly*, the division of the latter class of causes into those which result from the very conditions of our existence, and therefore operate generally among our species, and those which are of local and temporary existence only, and are commonly known by the name of morbid poisons.

In regard to the predisposition to disease, many important facts were well known to the pathologists of the last age; but as to one, and that probably the most important of all the circumstances of predisposition, our information has lately been much extended. This is the great predisposition, given to acute diseases especially, by the previous influence of causes of Debility, which may usually be referred either to deficiency of the natural excitements of the human system, therefore to imperfect nourishment, or defective nourishment from previous diseases, impure air, deficient exercise, long-continued heat, long-continued cold, or permanent mental depression; or else to excessive and exhausting excitement, therefore to fatigue, watching, or intemperance of all kinds.

The great amount of disease and mortality, which may be traced to the operation of these debilitating causes, applied long previously to the commencement of any diseased action, has been illustrated by statistical inquiries into the health and probability of life of different classes of the community, and of the inhabitants of towns as compared with those of country districts; and among the authors of such inquiries, Drs. Perceval (of Manchester), Bisset Hawkins, [Sir James] Clark, and M. Villermé, [Quetelet, and Chadwick, and W. Farr,] deserve particular notice. The influence of some of the individual causes now mentioned has been more specifically demonstrated by the experience of military and naval medical officers; among whom we may particularly mention Sir Gilbert Blane, Sir James Macgrigor, Dr. Trotter, Dr. Johnson, Dr. Robertson, and Dr. Lus-combe.

Of those exciting causes of disease which are of pretty uniform operation, the application of cold is that which it is most important to understand; and on this subject our knowledge has been rendered much more satisfactory and precise by the observations of Dr. Currie, and by the practitioners who followed his directions as to the use of cold in febrile diseases. From those obser-

vations it may be stated, as a general result, that the morbific effects of cold depend, not simply on the temperature applied, nor on the suddenness of the application, nor on the previous heat of the body; but on the intensity and duration of the sensation which is produced by its application, and especially on the circumstance which primarily determines the duration of that sensation, viz. the facility with which, from the previous state of the system, the circulation on the surface of the body is checked and depressed.

In regard to the Morbid Poisons, which excite diseases often of the most virulent and appalling character, but confined to certain seasons or localities, there has been much and often violent discussion within the last forty years; during which time the contagious nature of the fever of this climate, of yellow fever, of plague, of purulent ophthalmia, of erysipelas, dysentery, and malignant cholera has been successively and freely agitated; the laws of the origin and diffusion of the malaria producing intermittent and remittent fevers have been investigated; and the extraordinary protection against small-pox afforded by vaccination has been first established as a general law by the observations of Jenner, confirmed by others in all parts of the world, and afterwards ascertained to be subject to limitations, the exact amount of which is still doubtful.

Perhaps the most important results of the labours bestowed on these important subjects are the following:—

1. The contagious nature of the common continued fever of this country has been firmly established; at the same time the truth of the representations of the older authors, as to the variations to which this disease is liable at different times and places, in duration, in symptoms, in the effects of different remedies upon it, and the extent to which these can be borne, and in the degree of its contagious property, has been fully and repeatedly demonstrated.

2. The influence of the most important auxiliary causes which favour the extension of this disease,—the cold weather of this climate, imperfect nourishment, and mental depression,—has been fully exemplified and repeatedly observed, particularly in the disastrous history of various military enterprises, and in the equally melancholic civil history of one unfortunate portion of the British dominions:* whether these circumstances of predisposition ever suffice for the generation of the disease, without the aid of a specific contagion, is perhaps still doubtful.

3. It has been well ascertained, particularly by the researches of Dr. Bancroft, that neither the accumulation of human effluvia from healthy persons, nor the effluvia from putrid animal and vegetable matters, (however injurious to the strength, and in various ways to the health, of the human body,) are a sufficient cause for the production of contagious fever.

4. Several of the conditions which appear chiefly to favour the development and propagation of the malaria, which is the other great cause of fever, have been sufficiently investigated, perhaps more successfully by Dr. Ferguson, (Edinb. Philosophical Transactions, vol. ix.) than any other author. It appears certain that the stagnation, and subsequent evaporation of water on the earth's surface are essential to the development of this poison, and that the higher the temperature at which this evaporation takes place, the more violent is the poison generated. It is very doubtful whether any putrescent matter is necessarily connected with its formation; but it must be admitted that there is some condition necessary to that process, which is still unknown, and that we must still be guided in a great measure by experience, in judging of the situations where it is chiefly to be apprehended. [From all the writer's observations, it would not seem to be either of animal or vegetable origin, but to be geological, or connected with locality.]

5. It has been clearly ascertained that the contagious fever of this climate, which usually abates during the summer, is seldom or never met with in the tropical climates; and this fact seems to be illustrated by the important observations of Dr. Henry, by which it appears that the contagious effluvia of the exanthemata, as well as of typhus, loses all its efficacy at the temperature of 140° or even 120°. On the other hand, it is certain, that the fever from malaria is greatly aggravated in these climates, and takes, occasionally, quite the form of the most malignant Yellow Fever. [Yet there would seem to be a marked difference between yellow fever and those fevers that are commonly regarded as malarious—intermittent and remittent, for example.] It has been ascertained, also, that the worst epidemics of that kind, which have so frequently appeared in certain localities in the hot climates, are generally to be ascribed to certain local causes, and are confined within certain limits or boundaries; so that among those who keep beyond these limits the disease hardly ever spreads, whatever the intercourse of persons already affected with others may be; as has been repeatedly exemplified at Gibraltar, New York, &c.; but it is still doubtful whether, within these limits, and at these times, the worst form of the yellow fever does not spread by contagion.

6. It has been equally demonstrated that the Plague spreads by contagion chiefly, if not exclusively, although with very various rapidity on different occasions; and that precautions to prevent the intercourse of the sick with the healthy are more certainly efficacious in checking the ravages of that than any other epidemic disease; as has been repeatedly found in the experience of the British colonies in the Mediterranean, as well as of the army in Egypt. [Still, many observers deny its contagious nature].

7. It has been shown, to the satisfaction of the greater number of medical men who have seen the diseases prevailing epidemically, particularly in civil life, that the purulent ophthalmia is a contagious disorder; and that erysipelas and dysentery do also occasionally spread by contagion; but it has also distinctly appeared that completely isolated cases of the two last diseases, occur so much more frequently in some seasons and countries

* It is gratifying to be able to state that the members of the *medical* profession in Ireland cannot be charged either with want of zeal to alleviate the distresses of their countrymen, or with want of judgment and intelligence, in attempting to draw from these distresses, themselves, lessons of the highest importance to posterity.

than in others, that there must be some cause, not yet understood, corresponding to the idea usually affixed to the term "epidemic or atmospheric influence," which aids in determining many attacks of these diseases.

8. The numberless observations which have been made, in so many different quarters of the globe, on the diffusion of the malignant cholera, have still left such an obscurity on that point as clearly to indicate that the mode of extension of that "nova pestis" must be very peculiar. The present writer has no difficulty in expressing his own conviction that the disease has a contagious property; which conviction is founded simply on the repeated observation of persons who had intercourse with those ill of the disease, becoming themselves affected in a proportion infinitely greater than those, similarly circumstanced in other respects, who avoided such intercourse. But, on the other hand, it is equally certain that in various instances, where it has prevailed epidemically, this superior liability of those holding intercourse with the sick has not been observed; it has affected so many, in whom no such intercourse could be ascertained, or appeared possible, and has left unaffected so many others, whose intercourse with the sick had been frequent and close,—that we can hardly suppose contagion the only mode in which it can diffuse itself.

It may be added, that whatever be the true origin of the poison which generates the cholera, it certainly possesses in an extraordinary degree the properties, which all other morbid poisons possess in some degree, of lying latent for a length of time,—in certain localities, or in the constitutions of individuals, or in both,—and afterwards resuming its activity and rapidly extending itself, without any assignable cause.

The additions which have been made to our knowledge of the nature and proper treatment of diseases during the time under review, may be traced, for the most part, to the extent and minuteness with which the study of morbid anatomy has been cultivated. The example of Baillie, in London; the lectures of the late Dr. Gregory, in Edinburgh, (who, although not deeply learned in morbid anatomy, was keenly interested in the subject, and took every opportunity of inculcating its importance;) the laborious researches of Abercrombie and others, have had much influence in extending this study among British practitioners; but we must admit that it is to the zeal of the profession in France, and to the opportunities afforded by the French hospitals, that we are chiefly indebted for the increased extent and precision of our knowledge of the changes of structure effected in the human body by disease.

This study has, indeed, engaged so much attention of late years, that the term pathology has very often been used as synonymous with morbid anatomy; as if there were no other sources, from which we could draw our knowledge of the changes in the living body, constituting disease, than the changes in the dead body which disease leaves behind it. This, however, is a manifest error in science. These alterations in structure produced by disease are only one of the elements of our reasoning on the nature of diseased actions themselves; and there are many other facts, as to the external causes of diseases, the nature of their leading symptoms, their consequences, local and general, in the living body, and the *juvantia* and *lædentia* affecting them, which likewise furnish the proper elements of inductive reasoning, for the determination of those laws of the animal economy, which it is the object of the science of pathology to establish.

It is also an important practical error to fix the attention, particularly of students of the profession, too much on those characters of disease which are drawn from changes of structure *already effected*, and to trust too exclusively to these as the diagnostics of different diseases; because in many instances these characters are not clearly perceptible until the latest and least remediable stages of diseases; the very object of the most important practice in many cases is to *prevent* the occurrence of the changes on which they depend; and after they are established, the cases are very often hopeless, or admit only of palliative treatment. In those diseases in which most can be done by art, our practice must always be guided in part by conjecture, because, if we wait for certainty, we very often wait until the time for successful practice is past; and therefore, although an accurate knowledge of the whole history of each disease is essential to its proper treatment, yet in a practical view the most important part of its history is the assemblage of symptoms, by which its nature at least, if not its precise seat, may often be known, before any decided lesion of structure has occurred. Accordingly, when this department of pathology is too exclusively cultivated, the attention of students is often found to be fixed on the lesions to be expected after death, much more than on the power and application of remedies, either to control the diseased actions, or relieve the symptoms, during life.

But although in this, as in other instances, there has been an admixture of error, if not in our scientific acquisitions themselves, at least in our estimate of their value, and our judgment of the uses to which they may be applied, yet it is evident that the department of morbid anatomy is that in which the grand improvement of medical science has lately been effected; and that it is from judicious reasoning on the more intimate knowledge thus acquired of the nature of diseases, that any material improvement in the precision of our practical rules has resulted.

These observations apply particularly to the case of inflammatory diseases, those in which remedies avail the most, and with the history of which, therefore, it is most important to be familiar.

The characteristic effects of inflammation, adhesion, suppuration, ulceration, and gangrene, have been investigated with great acuteness and success by Mr. Hunter and his followers, among whom Dr. Thomson, of Edinburgh, [Professor Alison himself, Dr. Macartney, of Dublin, and Dr. C. J. B. Williams,] may be particularly noticed; and the provisions of nature for the favourable terminations of all these processes are now well understood. The nature of the process of inflammation itself has been carefully scrutinized, in so far as microscopical observations avail in the re-

search, by Drs. Wilson Philip, Thomson, Hastings, and Black; and more lately by Andral, Gendrin, Kaltenbrunner, [Magendie, Gulliver, W. Addison,] and others. It may be confidently asserted that these observations have proved the inadequacy of any explanation of the process, which turns merely on the changes in the contractile power of the vessels concerned. It was, indeed, clearly perceived by Mr. Hunter, that changes in the vital properties of the blood itself must necessarily be taken into account, in attempting any explanation of inflammation and its consequences: and the inquiries of the three last-mentioned continental authors, of Schröeder van der Kolk, Pring, Rogerson, and others, have opened a prospect of some more definite information being acquired as to the nature of the essential changes which these vital properties undergo during these processes. [See a Report on the Present State of Knowledge of the Nature of Inflammation, by Mr. T. Wharton Jones, in *Brit. and For. Med. Rev.* for April, 1844, p. 567.]

But the most important recent additions to our knowledge of inflammatory diseases have been the accurate observations made on the varieties of inflammation, and consequently increased precision of our views as to the different *modes of fatal termination* to be apprehended in different inflammatory diseases; and these may be considered under several distinct heads.

1. Much has been done in regard to the different course and effects of inflammation, as it affects *different textures* of the body; and the fact has been established, that even in its acute, and still more in its chronic form, inflammation frequently spreads extensively, lasts long, and produces decided lesions in one texture, without in the slightest degree affecting others in its immediate neighbourhood. Repeated observations on the bodies of those who have died of pleurisy, of bronchitis, of peritonitis, and of dysentery, as well as of more external inflammations, leave no room for doubt on this point. Formerly the diagnosis of different inflammatory diseases seldom extended farther than the *organs* chiefly affected, and the functions of which were deranged; but we now consider the *texture* primarily affected to be one of the most important objects of inquiry, and to be frequently within the reach of careful scrutiny.

The variety in the course and effects of inflammation to be expected in different textures,—in the cellular, serous, fibrous, and mucous membranes, in the different parenchymatous viscera, the muscles, bones, &c. was first pointed out as a particular object of attention by Bichat in France and Dr. Carmichael Smyth in England; its importance was strongly inculcated by Dr. Gregory in his lectures; and our knowledge of these varieties in the different parts of the body, and of the symptoms by which the attacks of inflammation in the different textures may, in general, be first distinguished, has been greatly extended and improved by many other authors,—by Thomson, Abercrombie, Pemberton, Brodie, Travers, Hastings, and others in this country; and by Pinel, Corvisart, Bayle, Laennec, Rostan, Lallemand, Andral, Louis, &c. in France. The distinction of the different species of inflammation attacking the eye, and the accurate anticipation of the danger of each by all the recent writers on the eye, furnish a beautiful example of the increased precision which the attention to variety of textures has given to pathology.

Farther, not only the effects to be expected from inflammation in the various textures have been ascertained by dissections, but characteristic *symptoms* resulting during life from these consequences of inflammation in several parts of the body, not open to ocular inspection, have been clearly pointed out by recent authors.

This is remarkably the case in regard to inflammations within the chest. The lesions resulting from these, as well as other organic changes in that part of the body, may certainly be very frequently ascertained by manual examination, and by auscultation and percussion, according to the methods of Laennec, with a precision formerly unknown. The usual effects of the inflammation of the pleura, and of the bronchiæ, may almost always be recognised and distinguished by percussion and auscultation; and there are many instances of these diseases occurring without any complication, which might formerly have been confounded under the general term pneumonia, and which it is not only satisfactory, but practically important, even in their later stages, to distinguish, because they admit of relief from different modes of treatment. There is, in general, more difficulty in forming a judgment as to the existence or extent of inflammation in the substance of the lungs; for this inflammation is very frequently combined with others within the chest; and although the "râle crepitant" and the "peripneumonic sputa" are occasionally well marked and characteristic symptoms, yet they are by no means to be depended on as constant symptoms. The effects of inflammation, either of the external or internal surface of the heart, frequently show themselves unequivocally, on auscultation and percussion, and by the increased action and obvious enlargement of the heart resulting from them; but there are cases, particularly of the former, where much injury may be done, without such indications clearly presenting themselves, even to the most experienced observer.

One important result of the recent observations on the effects of inflammation within the chest is, the ascertained rarity of circumscribed collections of pus in the substance of the lungs, and the frequency of such collections exterior to the pleura; the established easy diagnosis of the two kinds of Empyema, the one with and the other without pneumothorax, from fistulous communication with the bronchiæ; and the distinction of the former class of cases of empyema, according as the communication has been opened from without inwards, in consequence of ulceration of the diseased pleura, or from within outwards, in consequence of tubercular disease and ulceration of the lungs; the former of these two cases admitting sometimes of gradual cure, the latter being only an accident in the course of incurable phthisis.

Another important addition to our knowledge of thoracic disease is the discovery of the frequency, and explanation of the nature, of the change called Emphysema of the Lungs, as a consequence of long-continued Bronchitis, particularly when combined with spasmodic Asthma.

All these improvements, as well as the original discovery of the application of the sounds heard in the chest to the diagnosis of its diseases, are to be ascribed chiefly to the industry and acuteness of Laennec.

The occurrence of inflammation of the Larynx and glottis in adults, tending to a fatal termination, by mere thickening of the membrane, by effusion of pus behind it, or by the œdema glottidis, without the formation of the false membrane of croup, is an important fact ascertained by the observations of Baillie, Farre, Lawrence, and many others; and the diagnosis of the cases of the kind in which the bronchi are unaffected, and an operation promises relief, is another advantage which the new methods of examining the chest afford.

The existence of inflammation of the Mucous Membrane of the great Intestines in all cases of dysentery, and of inflammation of the same membrane of the small intestines in a certain class of cases of diarrhœa, the diagnosis of inflammations of this membrane from those of the peritoneum, its remarkable tendency to ulceration, its frequent (though by no means uniform) combination with inflammation of the liver, particularly in the hot climates, and with continued fever in this climate, and the indications of its degree, and of its stage, to be drawn from examination of the stools, are important additions to our knowledge of abdominal inflammations, which we owe to the labours of Somers, Ballingall, Johnson, Robertson, and many other military and naval practitioners,—of Abercrombie, Cheyne, Harty, and others in this country, and of Petit and Serres, Broussais, Andral, Chomel, Billard, &c., in France. The instantaneous change of symptoms, violent pain, and rapid sinking, which succeed the perforation of intestine by an ulcer beginning in the mucous membrane, and effusion of feculent matter on the peritoneum; the correspondence of this accident to the perforation of the pleura in phthisis, and the evidence, thence resulting, of variety of endowment of the serous and mucous membranes, are striking illustrations of the increased precision of our pathological information.

The varieties of inflammation within the Head, and of its results, have likewise attracted particular attention, chiefly since the publication of the writings of Lallemand and Rostan on the softening of the brain, certainly one of the effects frequently produced by inflammation there. The inflammation of the membranes may often be distinguished, by the acuteness of the symptoms, in its earlier stages, from that of the substance of the brain. Much more minute diagnostic marks have been proposed by the authors just named, by Bouillaud and others; but subsequent observations have shown that on these no great reliance can be placed; and in fact, as the only symptoms which can yet be relied on, as indications either of inflammatory effusion or disorganization within the cranium, are affections of sensation or voluntary power, and as these result only from changes at the base of the brain, therefore generally in parts at some distance from the actual seat of disease, and the affection of which may be said to be accidental, it is evident that there may be great variety in the symptoms, independent of varieties in the diseased states themselves; and accordingly, we cannot with any certainty anticipate either the nature or the exact seat of the effects of inflammation within the head, from any symptoms or combinations of symptoms;—all that we can pretend to distinguish (and that not with absolute certainty) is the period of the disease when the symptoms no longer depend on the inflammatory action itself, but chiefly on effusions or disorganizations consequent upon it, and continuing after it has subsided.

2. The distinctions of inflammatory diseases according either to the organs or textures affected, and the usual effects produced in these, are not the only distinctions of practical importance in that class of diseases which have been elucidated by modern pathologists. A very important class of their observations relates to cases which, although running the usual course, and often with even more than the usual rapidity, are concealed or rendered *latent* by peculiarity of constitution, and can only be recognised with certainty by such unequivocal local indications of effusion or disorganization, consequent on inflammation, as those to which allusion has just been made. The circumstances in which these latent inflammations are most to be apprehended (which are in general those in which the system is much weakened, the quantity of blood lessened, and the sensibility blunted, as in the last stage of fever or of some of the febrile exanthemata,) are very important to be known, because, in some such cases, if the practitioner is on his guard, he may detect their existence while it is yet time to apply remedies.

Again, many important observations made by modern pathologists have given precision and authority to the statements of older writers, as to inflammations occurring and producing exactly their characteristic effects in various parts of the body, but running their course so slowly, as to take the form of *chronic* instead of acute disease; as in the case of cold or chronic abscess on the surface of the body; chronic pleurisy leading to extensive empyema, without either acute pain or inflammatory fever; partial inflammatory induration of the brain, or hepatization of the lungs confined to individual lobules, &c. The knowledge of this form of inflammation is obviously important, as suggesting and justifying a corresponding modification in the use of the usual antiphlogistic remedies.

The term Sub-Acute Inflammation has also been properly applied by Dr. Armstrong and others to a form of truly inflammatory diseases of various textures, where not only the symptoms, general and local, are milder, but the local consequences which show themselves much less extensive than in the more decided and acute cases, and the amount of depletion necessary to avert danger is much less, while at the same time there is no such extension of the period of the disease as to justify the use of the term chronic.

3. What makes it peculiarly important to attend to these varieties in the intensity and duration of strictly inflammatory disease, even in the same parts of the body in different individuals, or at different times in the same, is the obvious application of this principle to other cases, where the symptoms are in the first instance those of

inflammation, but the ultimate result is the establishment of other forms of disease, which have been often regarded as quite distinct from, or even incompatible with inflammation. Of this the most striking example is in the case of Dropsy, or serous effusion in various parts of the body, the connection of which with inflammation has lately been the subject of much inquiry.

The lectures of the late Dr. Gregory, and the writings of Rush, of Cheyne, of Abercrombie, [of D. Davis,] and others, have satisfied the great majority of practitioners in this country, that the acute Hydrocephalus of Cullen is to be regarded in general as an inflammatory disease, although in many fatal cases no other effect of the inflammatory action can be found than the serous effusion into the ventricles; and the cases recorded by Blackall, by Abercrombie, by Crampton, and many others, have also shown that there are many cases of general dropsy, beginning, or repeatedly renewed, by inflammatory attacks, and admitting of great relief from a certain extent of bloodletting, generally premised to, or combined with, the purgative or diuretic medicines. This practice, which had been repeatedly adopted by various practitioners, and again fallen into disuse, has been put on the proper footing by numerous dissections, which have shown the very frequent complication of dropsical effusion with repeated inflammatory attacks, (often of the sub-acute or chronic character, but known by their usual products,) in the heart, lungs, liver, or kidneys; while, at the same time, these observations sufficiently demonstrate that any great extent of dropsical effusion is hardly ever the effect of inflammation *alone;* that some more permanent lesion of these parts is usually likewise present; and that even when partly or chiefly dependent on inflammation in its origin, the effusion is very generally persistent long after this cause has disappeared.

Nor is dropsical effusion the only form of disease, usually regarded as chronic, to which we may confidently assert, (trusting to the information acquired by recent pathologists,) that inflammation may give rise, or into which it may graduate. Attentive observation shows that many of those organic changes of structure which are commonly called Obstructions in the more important viscera, whether combined with dropsical effusion or not, appear frequently to originate from the causes of inflammation, to be attended with some of the first symptoms of inflammation, and to combine themselves with, or graduate by insensible degrees into, the acknowledged effects of inflammation. It is true that in many other cases their invasion is quite gradual and insidious, and there is no evidence of more than mere "perversion of nutrition" in their development; and that such organic alterations of texture likewise differ essentially from the simple effects of inflammation, in being hardly at all liable to absorption, to which the simply inflammatory effusions are peculiarly prone; it is clear, therefore, that in every case there must be some condition, independent of inflammation, necessary to their production; yet the inference from the former class of facts is still a fair one, that an inflammatory action, generally of the sub-acute or chronic kind, is, in many cases, *one of the conditions* on which their growth depends. These points have been keenly discussed of late years by the French pathologists, particularly Broussais, Laennec, and Andral; the first of these authors certainly attributes too much to the "phlegmasies chroniques" as the cause of all chronic diseases; the second probably too little; and the conclusion now stated seems to agree very nearly with the opinion of the last, who is generally thought in this country the best informed and most judicious of the present French pathologists.

[Of late, however, by many pathologists, as by Papavoine, Fabre and Constant, Gerhard and Rufz, Piet, Barthez and Rilliet, and others, the acute hydrocephalus of authors has been regarded as tubercular meningitis, the tubercular matter being deposited in the meshes of the pia mater; and many of the cases classed under hydrocephalus are, unquestionably, of this character.]

Of those cases of visceral organic disease, often connected with dropsy, and often originating in inflammatory action, there is one, the frequency of which was not suspected, and the indications of which were not understood, until very lately,—viz. the granulated or tuberculated state of the secreting portion of the Kidneys, first ascertained by Dr. Bright to be the almost inseparable concomitant of the albuminous state of the urine, which had been previously noticed by Dr. Wells, Dr. Blackall, and others, in many cases of dropsy, but which exists also, not unfrequently, without any dropsical symptom.

This discovery is the more important, as the effect of the diseased condition of the kidneys is to alter the nature and diminish the quantity of one of the great excretions from the body; from which results, as the experiments of Dr. Christison and Dr. Bostock, [Rayer, Martin Solon and others,] have shown, a palpably diseased condition of the blood, and an undoubted example, therefore, of the kind of morbid changes to be apprehended from such a cause. All that has yet been ascertained on this point is this, that when the urine is albuminous, and its specific gravity low, and the serosity of the blood therefore unnaturally loaded with urea, or extractive matter resembling urea, the health is always precarious, inflammatory diseases of different parts are apt to occur, and organic disease, particularly of the lungs or brain, frequently supervenes; and that in the last stage of such disease, when the secretion is almost suppressed, slight febrile symptoms rapidly advancing to coma, as in the true ischuria renalis, have been repeatedly observed.

Again, the tendency of inflammation, when it occurs in particular constitutions, to pass into, or give origin to, organic disease, is thought by many pathologists to be remarkably exemplified in the case of scrofulous Tubercles, and to be one of the principles, regarding the origin of that very frequent and fatal form of organic disease, which it is most incumbent on the practitioner, with a view to the prevention of such diseases, to have constantly before his eyes. On this point likewise there has been lately a difference of opinion both among French and English pathologists; and it is evident that tubercles frequently originate without either the causes or the indications of inflam

mation showing themselves; and that the distinctions between tubercles and the usual effects of inflammation (particularly as to the subsequent liability to absorption) are such as to show, that they can in no case be ascribed to inflammation as their sole cause. But when all these admissions are made, it may still be held as a principle of the highest practical importance, that in certain constitutions or in certain circumstances, an inflammatory attack, if not very speedily remedied, is very likely to act as the immediate cause of a deposition of tubercles, and consequent chronic and nearly hopeless disease.

The nature of the peculiarity of constitution, which disposes to this rather than other consequences of inflammation, is in all probability to be sought in the composition and vital properties of the blood; and some of the microscopical observations of Gendrin, (particularly that of the presence of translucent globules in the fibrinous effusions of healthy inflammation, and their absence in incipient tubercles,) seem to afford a fairer prospect of successful investigation of this point than any former observations had given. In the mean time the external causes, which particularly favour the development of that constitutional peculiarity, and especially the relative efficacy of climate and of impure air, imperfect nourishment, and deficient exercise, during childhood and youth, in producing it, have been illustrated by statistical inquiries, of the kind formerly mentioned, which are necessarily much more valuable, in this view, than the records of the experience of any individual.

Besides the connection of inflammatory action with various forms of organic disease, of which we have thus spoken, much stress has been laid by some recent authors on increased determinations of blood, approaching and sometimes amounting to inflammation, as a main cause of many chronic diseases which are merely *functional*, e. g. of neuralgic pains, of different spasms, of dyspepsia and other effects of deranged secretions in the primæ viæ. This speculation has pretty certainly been carried too far by some, particularly by Broussais and his followers in France, and by the late Dr. Parry in this country. In many such cases it seems certain that the increased determination of blood is the consequence, not the cause, of other derangements of vital action; yet that it often occurs and aggravates the evil, and affords a fair indication for practice, seems well ascertained; and the remarks of Dr. Parry on the beneficial effects of spontaneous hæmatemesis in some cases of urgent dyspepsia, and the accurate observations of Dr. Wilson Philip on the effects of local bleedings in what he calls the second stage of dyspepsia, may be quoted in proof of this position.

4. Another important set of observations on inflammatory diseases consists of those which have been made on the characters, and progress, and peculiar dangers of Specific Inflammations resulting in general from particular causes only, and differing from the usual form of inflammation in the nature of their local symptoms and effects, or in the character of the accompanying fever, or in both these particulars.

The distinction of Phlegmonous and Erysipelatous inflammation in external parts, as well as of the specific cutaneous inflammations of the exanthemata, had indeed been long known, and our knowledge of the great variety of inflammations affecting the skin has been greatly extended and corrected, particularly by the labours of Willan and Bateman. But even Dr. Cullen, who referred the erysipelas, with great propriety, to his class of Exanthemata rather than Phlegmasiæ, and considered the fever attending it as by no means symptomatic of the inflammation, but as resulting from a cause acting in the interior of the system, and of which the inflammation was likewise an effect, had not a correct view of the peculiarity of the inflammation itself. He supposed that peculiarity to depend merely on the texture affected; the true skin being, according to him, the seat of this inflammation, while the phlegmon is seated in the cellular membrane. He did not advert to the circumstance, that the *disposition to spread* along the surface, and the *deficiency of organizable lymph* in the inflammatory effusion, were local symptoms equally peculiar and characteristic of this inflammation, as compared with other inflammations of the same texture, as the priority of the febrile symptoms, and their frequently typhoid character; and therefore did not form the notion which French pathologists annex to the term *specificité*, as applicable to this form of inflammation.

Subsequent inquiries have, however, distinctly shown, that this principle is of real and great importance, as applicable both to this and other inflammations. It appears from the researches of the late Dr. Duncan, of Mr. Travers, Mr. Lawrence, Dr. Butter, and others, that when this inflammation extends from the skin to the *cellular membrane*, as so frequently happens in erysipelas, it preserves the same local characters in the latter texture as in the former; that in some cases this kind of *diffuse* inflammation affects the cellular membrane extensively without extending to the skin; that it often prevails epidemically, and is certainly sometimes propagated by contagion or inoculation; that it may arise from different peculiar causes, of which the most frequent seems to be the introduction into the system of some kind of animal poison, as in the case of poisoned wounds from dissection: that in this as in other cases, when such a poison acts on the body, a peculiar derangement of the nervous system and depression of the vascular system are very often observed, giving to the fever attending such inflammation the character to which we apply the term Typhoid; and that there is frequently a danger from this form of fever, quite independent of that which the local inflammation could effect; and not to be remedied, sometimes even to be aggravated, by the use of means for subduing that local inflammation.

Farther, it seems well ascertained that on internal membranes, and sometimes in connection with this erysipelatous inflammation on the surface, there are examples of a similar *diffuse* form of inflammation, tending to serous and sero-purulent effusions chiefly, not to exudations of organizable lymph, and that the fever attending this inflammation is more or less perfectly *typhoid*; and the danger resulting from it so little in proportion to the intensity or duration of the inflammation,

that in the most rapidly fatal cases the inflammatory appearances found on dissection are generally the least obvious.

Such examples of internal erysipelatous inflammation may in some instances be pretty certainly distinguished from the more usual form of inflammation in internal parts; they have been most decidedly observed in the peritoneum; and the epidemic and contagious Puerperal Fever, although not the only case of the kind, is that to which the foregoing remarks most particularly apply; but in this as in other contagious diseases, there appears to be great variety, in different epidemics, particularly as to the extent to which the inflammation goes, and to which the remedies for inflammation may be safely carried.

These statements appear to be fair deductions from the facts stated on this subject by Armstrong, Hey, Mackintosh, Campbell, and others, who have witnessed extensive epidemics of this kind, particularly when compared with the cases of this form of peritonitis, (sometimes evidently in connection with erysipelas,) recorded by Dr. Abercrombie, and with several that have fallen under the observation of the present writer.

There is strong reason for thinking that there is something equally peculiar or specific in the inflammation of Dysentery, when it prevails epidemically, and when it extends itself (as the writer is satisfied he has occasionally observed) by contagion; and it seems quite certain that a peculiar spreading inflammation of the mucous membrane of the fauces, tending to a peculiar aphthous exudation on its surface, and attended with a dangerous typhoid fever, sometimes prevails epidemically, as in the experience of Dr. Bretonneau of Tours, who gave it the name of Diphtherite.

In all these cases it may be at least reasonably conjectured that a peculiar animal poison is either introduced into or generated in the blood, which circulates through the system, and by its depressing or sedative influence causes the peculiarities, both in the local and the general symptoms, and progress of the disease, which distinguish it from simple or *healthy* inflammation of the same parts. It is an important observation, first put in a clear view by Mr. Travers, that a similar peculiarity is given to the *general* symptoms resulting from external injuries, by the influence of a violent concussion or shock, affecting the system at the time when such local injuries are received; but it may be doubted whether the term Irritation, applied by him to the constitutional affection, either from such injury, or from specific inflammation, is the best that could have been chosen. The rapidly spreading Traumatic Gangrene described by Larrey and others seems to be an effect produced in some cases on the local inflammation consequent on a violent injury, by the concussion which has such an influence on the constitutional symptoms; and indeed more or less of gangrene or sloughing is always to be apprehended from inflammation excited in a system where the powers of the circulation are remarkably depressed.

That an animal poison, circulating and multiplying itself in the blood, is an adequate cause both for the local peculiarities and for the peculiar typhoid symptoms, attending the specific inflammations above noticed, appears pretty certain, not only from the analogy of the contagious exanthemata and their communication by inoculation, but also from what is observed as to the effects of inflammation affecting the lining membrane of veins, where much of the inflammatory effusions must necessarily be mixed with the circulating blood. In this case, even although the vein has inflamed from a simple injury, without evidence of any specific cause having been applied, such typhoid symptoms, according to the observations of Hunter, of Travers, James, Arnott, and many others, seem almost invariably to occur. Indeed, as the veins of the uterus have been found inflamed in several cases of puerperal fever, it has been suspected by Dr. Lee that that disease may be generally dependent on this cause.

Another observation which has been made on cases of inflammation of the veins, by Mr. Arnott and others, is likewise of great importance. It has been found that this inflammation is very frequently followed by rapid inflammation, and still more rapid purulent depositions in distant parts, particularly in the cavities of joints, or in the internal cavities; and it seems probable that it is in this way that we are to explain the occurrence of such rapid inflammation and suppuration in internal parts, particularly the Liver, which has been often observed after severe injuries of the head or other parts of the surface.

This observation ought evidently to be taken in connection with another, made by many recent authors, by Guthrie, Rose, and others in England, and by Dance, Velpeau, &c. in France, of the frequency of internal inflammation, going on with extreme rapidity to deposition of purulent or tubercular matter in internal parts, immediately after the amputation of a limb, where such formations from the blood had been previously established; and both observations should be taken in connection with the facts, which seem established by the researches of Velpeau, Kaltenbrunner, Gendrin, and others,—*first*, that the veins leading from extensive collections of matter, especially in chronic cases, are often found loaded with pus; and, *secondly*, that the conversion of globules of blood, or of fibrine, into pus, takes place not only in extravasated effusions, but *within the vessels* of parts in a certain stage of inflammation.

The inference from all these facts appears to be, that purulent matter generated in the human body itself, if by any means it is caused to circulate in the blood without finding a ready outlet, disposes not only to peculiar febrile symptoms, but also to inflammation of a peculiar character, which goes very rapidly to extensive suppuration, in whatever part may be most prone to such disease; and this is evidently an important addition to our knowledge of Specific Inflammations, and is applicable, as will presently appear, to several cases of the most important chronic diseases.

The inflammation of Syphilis is another example of specific inflammation resulting apparently from a morbid poison circulating in the blood, and falling on particular textures; and in regard to the several points of great importance seem to have been ascertained by the observations of Abernethy, Pearson, Rose, Guthrie, &c. in London, of Carmichael in Dublin, of Dr. Thomson in Edinburgh, [of Ricord of Paris,] and others, par-

ticularly the variety of its forms and progress in different individuals even at the same time, and the more gradual change of the character of the disease and malignity of the virus in the progress of time; the fallacy of the old opinion that in any of its forms (as they now present themselves) the disease is absolutely void of natural tendency to a favourable termination; the variety of treatment which its different forms demand; the frequent combination of syphilitic inflammation, either with healthy inflammation on the one hand, or with scrofulous disease on the other; the aggravation of the disease, in either case, which may result from the use of mercury; and the proper restriction of the virtues of this medicine, in regard to syphilis, to the character of an *alterative* rather than an *antidote*.

The inflammation of Gout is another to which the term Specific is properly applied; and the important discovery of Dr. Wollaston, of the existence of uric acid in the concretions which result from long-continued gouty inflammation, at once tends to explain the known connection of gout with the calculous diathesis, and connects this with the other specific inflammations dependent on a morbid matter in the blood.

The inflammation of Rheumatism may also be held to be strictly specific, although the existence of any peculiar ingredient in the blood cannot be ascertained. That there is something peculiar in the vital constitution of the blood in this disease appears, however, to be rendered highly probable by the nature of the peculiarities that most remarkably distinguish it; by the tendency to affect different parts and textures in rapid succession; by the total absence of suppuration as an effect of this inflammation; by the apparently increased proportion of the fibrine, and complete separation of it from the red matter in the blood drawn, and by the remarkable proportion of fibrine in the exudation produced by this inflammation when it affects the heart. The frequency and danger of the affection of the heart and pericardium in this disease have been completely established by the observations of Pitcairn, Dundas, Wells, Davis, Abercrombie, and others, and is one of the important additions lately made to Pathology. The circumstances in which it is most to be apprehended are by no means so clearly made out; but the writer has no difficulty in stating his conviction, that large and repeated bleedings in the beginning of rheumatism increase the risk of this metastasis; and in assenting to the observation of Dr. Elliotson, that after it has occurred it is more properly met by local than general bleedings. The labours of Willan and Bateman have been more successful than those of any others in distinguishing the many different forms of inflammation (particularly chronic) to which the skin is liable, but the classification of these diseases, which they have attempted, is more formal and precise than the nature of these ever-varying forms of disease will justify.

5. The great improvements which have been thus effected in our knowledge of the history and varieties of inflammatory diseases are of practical importance in the treatment of such diseases, not by suggesting new remedies, but chiefly by giving us more precise information than we could otherwise have had, of the particular danger which is threatened in each case of such diseases, and of the particular symptoms indicating such danger; and thus guiding us as to the proper time and the proper extent of the application of those, which we already possess and understand. Many attempts have been made, during the period under review, to add to the number of the general antiphlogistic remedies, or of those adapted to particular inflammatory diseases; and it is generally thought that some important auxiliaries to bloodletting and the other evacuations have been discovered; but it must be owned that there has been no such decided success in this inquiry as in those of which we have already spoken: and although it is right to avail ourselves of these auxiliaries in all cases where evident contra-indications to them do not exist, yet, as a general rule, in the early stage of inflammatory diseases the less that is trusted to them, and the more to the ordinary means of depletion, the better.

This observation may be particularly applied to the use of Mercury in inflammatory diseases, which has been so highly recommended as a remedy for inflammations by Hamilton of Lynn Regis, Armstrong, Travers, and various other practical authors within the last half century, that its virtues might be supposed to have been completely ascertained; but those who are aware of the fallacies attending the observation of the effects of remedies in acute diseases, particularly of such as are only employed as auxiliaries to others of acknowledged efficacy, can easily understand that they may have been much overrated. It has been often represented that not only the purgative mercurial medicines, as general evacuants, and as means of acting particularly on the secretion of the liver, are of peculiar importance, but the action of mercury on the system at large is the surest means of controlling those effusions, and particularly the effusion of coagulable lymph, on which the danger of several inflammatory diseases essentially depends; and in some instances a less defined and more specific virtue in checking inflammation has been attributed to the constitutional affection from mercury. Thus the remedy has been successively vaunted in the case of acute hydrocephalus, of cynanche trachealis, or laryngea, and (generally in the form of calomel and opium) in that of pneumonia, bronchitis, pleuritis, pericarditis, peritonitis, hepatitis, and dysentery; and reference has been often made to the effects which may be observed from it in inflammation of the iris, tending to effusion of lymph there, as demonstrative evidence of its peculiar efficacy.

But it may be stated with confidence, that in the opinion of many of the best informed members of the profession, there has been much exaggeration in all these statements. That there is something very peculiar in the effect of mercury on acute inflammation, particularly of the liver and of the mucous membrane of the bowels, in the hot climates, the numerous and concurrent authorities which might be quoted on the subject leave no reason to doubt; but that any such decided effect can be observed from exciting the specific effects of mercury (marked by its action on the mouth) during the acute stage of any internal inflammation in this country, has certainly not

been established to the satisfaction of most practitioners. That calomel is one of the most convenient purgative medicines in such diseases is certain, and it is equally certain that it is one of the best *corrigents* that can be used along with opium, when the soothing effects of the latter medicine are demanded; because it both corrects its constipating effect, and probably aids in determining its action on the skin, and, when given with opium, much more generally represses than excites vomiting. When given so as to act only in these ways, it may be unquestionably held to be a useful, though not one of the most powerful remedies in inflammatory diseases. But when its action on the mouth has been excited in the course of acute internal inflammation, (which is the only fair way of judging of any specific agency of the mineral on the inflammatory process,) we have not only been very generally disappointed of seeing any improvement of the symptoms immediately follow that change, but are constrained to add that we have more frequently seen an aggravation of them.

In more chronic inflammation, attended with slighter febrile symptoms, or when strictly a local disease, and tending obviously to gradual deposition of coagulable lymph, it is generally allowed that a certain degree of deobstruent rather than antiphlogistic efficacy (unfortunately often inadequate to the evil to be overcome) is attributable to the agency of mercury on the constitution. It is in those cases of syphilis where chronic induration around the ulcers is the most characteristic appearance, that the beneficial action of mercury is in general most distinctly seen; and not only in the case of iritis, but in inflammation of the periosteum, of the larynx, of the liver, perhaps of the peritoneum, when sub-acute or chronic, a similar beneficial influence is sometimes distinctly perceptible. Two cautions, at least in this climate, are, however, certainly important: *first*, that a dysenteric affection of the bowels is often produced by mercury affecting the system; and, *secondly*, that it very often acts as a cause or aggravation of scrofulous disease, in those who have that very common tendency.

Another auxiliary to bloodletting, in inflammatory diseases, particularly in inflammations of the chest and in rheumatism, which has come into pretty general use in this country, is the solution of tartar-emetic, given in frequently repeated and often large doses, but without exciting vomiting. The possibility of patients in inflammatory diseases taking very large quantities of this and many other medicines, particularly if they be not largely bled, without the usual effects of these medicines showing themselves, has been abundantly demonstrated by the experience of Rasori and many other Italian physicians, and of Laennec and his followers in France; but whether there is any peculiar advantage in establishing this "tolerance" of the medicine, and then trusting to a remedy which produces no sensible effects, is a very different question. Under the impressions that we have in this country of the efficacy of bloodletting in acute inflammations, and of the comparative inadequacy of all other means yet proposed, we do not think ourselves justified in placing our chief reliance on this treatment, excepting where the loss of blood is clearly and strongly contraindicated. When bloodletting is pretty freely employed, much smaller quantities of the tartar-emetic than the continental physicians are in the habit of prescribing are found with us to excite and maintain nausea; and it certainly has not been shown, to the satisfaction of the practitioners in this country, that the medicine, in any way in which it can be given without sensible effect, is a more powerful antiphlogistic than when used so as to maintain nausea for hours together. When given in this way, (for which purpose one-third to one-half of a grain every two hours will usually be found sufficient) it is now generally regarded as the most powerful auxiliary to bloodletting in the diseases above-mentioned, and in particular has in a great measure superseded the use of Digitalis as a sedative and antiphlogistic; the general judgment in regard to the last being, that in moderate doses it is inefficient in this view, and in larger doses unmanageable and hazardous.

The colchicum is another medicine introduced within the last twenty years into practice, with the character of an antiphlogistic or sedative rather than an evacuant; and in the case of a fit of gout, the effect of a few doses of this medicine is certainly often more nearly specific than that of any other medicine which we can mention, in an inflammatory disease. But experience, as well as theory, might be quoted in favour of the doctrine, which was keenly advocated by the late Dr. Gregory in his lectures on gout, that the human body always becomes peculiarly liable to other more dangerous diseases, when the attacks of gout are arrested in any other way than by the regimen which corrects the tendency to the disease. The antiphlogistic virtues ascribed to colchicum in other inflammatory diseases are much less generally admitted; but it is generally thought that, by the continued use of this medicine, attacks of acute rheumatism may in many persons be somewhat alleviated and shortened.

A change, and, in the opinion of the present writer, a very material improvement, has taken place within these few years in the judgment of many practitioners as to the use of opium in abdominal inflammations, whether affecting the serous or mucous membrane. It has been clearly shown by Dr. Armstrong and others, that when full bleeding has been premised, opium may be given freely and repeatedly, often with extremely good effect as to the relief of suffering; certainly without any injurious effect on the alvine evacuations, (which seem frequently to be promoted or procured more easily by enemata after the use of opiates;) and it may be pretty confidently asserted, with a considerable diminution of the mortality below what is common when bloodletting and purgatives are the only remedies employed. It is very doubtful, however, whether the notion of Dr. Armstrong, that opiates are here of use by their diaphoretic agency, is the correct one. In the cases which the present writer has observed, the beneficial effect of the opium has been best marked when the pulse has been early much depressed, and has not risen after bloodletting, so that farther loss of blood has seemed hazardous or impracticable. When opium in these circumstances has quickly relieved pain and vomiting,

and procured sleep, the pulse has frequently improved beyond expectation; and a patient who previously seemed quite exhausted has been restored to a state in which farther bloodletting, if required, has been perfectly well borne. That opium, as an auxiliary to bloodletting in these inflammations, can lessen the quantity of blood required to be drawn is very doubtful; but unless the writer is greatly mistaken, it may be confidently asserted that it will enable patients to bear a loss of blood under which they would otherwise have sunk, and thus permit the effectual remedy to be applied repeatedly, and ultimately with success, in cases where it would otherwise have become inapplicable. Of this the writer has been convinced, not only by finding the mortality from the disease under his own observation less since he has given opium freely, (which might have been accidental,) but especially from observing that in the cases which proved fatal under this treatment, the extent of inflammatory appearances found on dissection has always been great and unequivocal; very often indeed these have been complicated with organic disease; whereas, before he adopted this kind of practice, he has repeatedly had the mortification of seeing patients sink early in the disease, in whom the inflammatory appearances found on dissection have been remarkably slight,*—certainly less than must have existed in other cases, where recovery took place. Death in cases of abdominal inflammation does not depend, as in most other internal inflammations, on the lesion of any organ essentially concerned in maintaining the fundamental function of circulation; it results from a sympathetic affection of the circulation consequent on the inflamed state of the intestines; it can be demonstrated that this sympathetic affection is much greater in some persons than in others, suffering under the same amount of abdominal inflammation; and it seems reasonable to suppose, that whatever blunts the intensity of the sensations, produced by the disease in the bowels, and procures ease and sleep to the patient, will lessen the degree of that sympathetic affection of the circulating system. It should always be remembered, (whatever judgment be formed of this or other individual remedies,) that it is not by interrupting the functions of the bowels themselves that acute enteritis is fatal; that restoring the functions of the bowels is therefore only a secondary object, requiring little aid when the main object can be accomplished, and certainly not to be urged as long as there is any risk of the means used to accomplish it aggravating the inflammation. In this respect a useful practical caution may be fairly deduced from the more accurate knowledge we now possess of the causes of death in inflammatory diseases.

The advantage of local bloodletting by punctures or incisions, in those cases of diffused inflammation of external parts, which threaten to be dangerous by extensive suppuration and sloughing, has been established by the observations of O'Halloran, Copland, Hutchinson, Lawrence, Duncan, and many others.

The additions recently made to our knowledge of idiopathic fever may be put in a smaller compass than those which regard inflammation, because the study of morbid anatomy gives us much less assistance in this inquiry, and notwithstanding the amount of labour bestowed on it, much less real and definite improvement has been effected.

It has been ascertained, chiefly by the labours of the French pathologists, but likewise by those of many authors on fever in London, Dublin, and Edinburgh, that the lesions most generally found in fatal cases of what is usually called continued fever, in Europe, are serous effusion in the ventricles and between the membranes of the brain; an increased vascularity, with increased secretion of mucus, on more or less of the bronchial membrane; an œdematous, and often a condensed and softened state of part of the lungs; and thickening, patches of vascularity, and partial ulceration or sloughing, of some part of the mucous membrane of the primæ viæ, especially of the glandular structure there, and most frequently at the lower part of the ileum, often attended with enlargement of the corresponding mesenteric glands. The blood found in the body, or drawn from it during life, very generally, if not uniformly, coagulates less firmly than in health, and sometimes, especially in cases rapidly fatal, is nearly fluid. All other morbid appearances are comparatively rare, and several appearances, particularly congestion of blood in the back part of the lungs and in the mucous membrane lining the depending portions of the intestines, are fallacious; depending on the stagnation of the blood in these parts, both after death and in the extreme stage of debility before death, and on the imperfect coagulation of the blood.

It seems to be also ascertained that the whole of these appearances are seldom found in any one case; that those found are often remarkably various in different individual cases, although a great portion of the symptoms may have been very similar; that although all these appearances are such as occur in decided inflammations, and form part of their character, yet the effusions of coagulable lymph and of pus, which are those most characteristic of inflammation, are very rarely found after fevers, and that after some cases of well-marked continued fever these morbid appearances are altogether absent.

The question that has been most keenly debated of late years, both in France and this country, is, whether all the symptoms of continued fever can be ascribed to the influence of local inflammations in some part of the body, and what is usually called idiopathic fever be thus resolved into symptomatic; or whether fever is a general disease of the system, with which certain local inflammations, sometimes in one part and sometimes in another, frequently combine themselves. The former doctrine has been warmly espoused by Broussais and his followers in France, and by Dr. Clutterbuck, Dr. Mills, and others, in this country; but the opinion of some of the most eminent of the Parisian pathologists, and of the school of Montpellier, and the general opinion of

* It is proper to state that the writer has been oftener disappointed of the effects of opium in acute dysentery than in peritonitis, and that in some cases of the latter disease which he has seen prevailing epidemically, and as he believes spreading by contagion, he has also found it quite inadequate.

the profession in this country, is decidedly in favour of the latter; principally for the following reasons, which, it will be observed, are chiefly taken from the history of the disease as known from observation of the living body, and have been, therefore, too much neglected by those whose notions of pathology are limited to observations on the dead body, and the inferences thence directly resulting.

1. The cases to which we give the name of fevers may be distinguished in practice, and in general without difficulty, if their whole progress is traced, from the other cases in which inflammations of the same parts are found on dissection; by the slighter degree of the local symptoms, as compared to the intensity of the general symptoms; by the greater depression of strength, and particularly the easier depression of the strength of the circulation; by the greater deficiency of secretions, as shown, after some days, by the dryness of the mouth and tongue; by the greater disturbance of the nervous system, and greater prevalence and peculiar character of delirium, generally blended with a peculiar tendency to stupor; by the imperfect coagulation of the blood, or aggregation of the coagulum; and not unfrequently by the appearance of a peculiar cutaneous eruption.

2. The cases of fever, thus characterized, are found to be generally of local and temporary existence among mankind, and are for the most part distinctly referable either to a malaria or a contagion; and thus, in their origin as well as their symptoms, bear an analogy to the effects of certain Poisons on the living body; whereas cases of Inflammation, resembling the effects of injuries or accidents rather than of poisons, occur in pretty uniform frequency in all great communities similarly situated as to climate and habits of life.

3. When the cases, which are thus characterized as fevers, prove fatal, the appearances on dissection are very generally slighter, (particularly in the circumstance already remarked, of the general absence of the most characteristic inflammatory effusions,) than those which we are accustomed to see in the cases to which we give the name of Inflammations; therefore they do not afford so satisfactory an explanation of the fatal event; and occasionally they are altogether absent.

4. The cases thus characterized as fevers, have a much greater tendency to spontaneous favourable termination, than is seen in cases of undoubted inflammation, where the same internal parts are affected, and the same amount of febrile symptoms exists; as is seen in the regular decline of the paroxysms of intermittents, and in the frequent decline of continued fever, with or without critical evacuation, where no active remedies are used.

5. The decline of the cases characterized as fevers very often takes place under the use of stimulating remedies, which are known by experience to be hurtful in similar stages of undoubted inflammations; so that the experience of the *juvantia* and *lædentia* clearly indicates a distinction of these diseased states.

6. When patients recover from the worst stage of the cases characterized as fevers, with little or no artificial evacuation, or under the use of stimulants, experience shows that the health is more perfectly restored, and that there is much less risk of organic diseases succeeding them, than may always be apprehended when recovery takes place from decided and dangerous internal inflammation, under a similar treatment.

[7. The researches of MM. Andral and Gavareit have clearly shown, that in all cases of inflammation, the ratio of the fibrinous element of the blood is augmented, whilst in fevers of all kinds, unless when complicated by manifest local inflammation, it is diminished.]

These considerations would entitle us to regard fevers as specifically different from inflammations, even if certain inflammatory appearances on individual parts of the body attended the general febrile symptoms as uniformly in them, as in the contagious exanthemata; but this conclusion is much strengthened by the fact already stated, that the parts of the body in which inflammatory appearances may be found after death from fevers are remarkably various; and by observation, which may easily be made in such fatal cases, that the only symptoms which can be certainly connected with the appearances on dissection, particularly in the chest or abdomen, are often symptoms occurring late in the disease, and sometimes apparently supervening, from known causes, on the original affection.

In regard to the essential nature of the morbid state, which is thus properly distinguished both in theory and practice, from the effects of inflammation, we cannot say that more progress has been made of late years, than in regard to the essential nature of the progress of inflammation itself. As, indeed, all explanations are founded on comparisons, and as the phenomena in both these cases hardly admit of comparison with any others in nature, it is not to be expected that this investigation can ever be carried far. And as it is generally allowed that fever (both symptomatic and idiopathic) originates in the capillary vessels, i. e. in that part of the living frame which is the seat of the functions hitherto involved in the greatest obscurity, pathologists have been naturally and properly deterred from prosecuting the inquiry, until this department of physiology be farther elucidated. It may be stated, however, that the account given by Hoffmann and Cullen, of the *febrile reaction* consequent on the diminution of secretions and excretions in the commencement of fever, of the increased stimulation of the heart being consequent on obstructed circulation in the capillaries,—may still be held to be so far satisfactory;* but that the idea of a Spasm of the extreme vessels being the immediate cause of that diminution and obstruction, and thereby of the increased stimulation of the heart, has neither been confirmed by any actual observations, nor generally regarded as a satisfactory account of the phenomena; and perhaps the least theoretical expression of what is known on the subject is merely this, that there is, in the commencement of fever, a *deficiency of the vital actions* in the capillary vessels, naturally

* Perhaps the most striking fact which can be stated in support of that doctrine, is the rapid abatement of the symptoms, and shortening of the period of a paroxysm of intermittent fever, observed by Dr. Mackintosh and others to result from bloodletting in the cold stage, which will necessarily lessen the amount of stimulus then acting on the heart.

followed by increased excitement of the heart; and that, in the case of idiopathic fever, this is combined with the peculiar sedative agency of a poison, generated in or absorbed into the blood, the effect of which varies remarkably in intensity on different occasions, and is often very dangerous; although, like that of other poisons introduced into the system, it is essentially transient.

The most important improvement which has been lately effected in our knowledge of idiopathic fever, as in the case of inflammation, may be said to consist in the more accurate discrimination of its Varieties; and the most important of these may be ranked under the following heads;

1. Certain distinctions, of obvious practical importance, have been pointed out as to the intensity and succession of the proper febrile symptoms themselves. The variety described by Dr. Armstrong, Dr. Bateman, and others, under the title of Congestive, though perhaps improperly named, may sometimes be distinctly recognised, both in cases of fever and of the contagious exanthemata; and may be said to be that in which the sedative agency of the remote cause of the disease acts with extreme force, the usual reaction is suppressed or obscured, and the symptoms of the first or cold stage assume their maximum of intensity: the chief appearances being, feebleness of circulation and of muscular strength, coldness of surface, and stupor or confusion of thought, resembling the first effect of concussion of the brain, rather than the usual febrile delirium.

Again, the distinctions drawn by French authors, between the Fièvre Adynamique, in which the weakened state of the circulation, the Fièvre Ataxique, in which the disorder of the nervous system,—and the Fièvre Inflammatoire, in which the degree of febrile reaction,—is the predominant character, although not essentially different from those by which the Low or Putrid Fever, Brain or Nervous Fever, and Inflammatory Fever, had been previously characterized in this country, are yet important, both as familiarizing practitioners to these varieties, and to the causes which may sometimes be assigned for them, and as giving something more of precision to the use of these terms.

[It has been, too, a question of no little importance to determine, whether adynamic fever differs materially in different countries, and at different times in the same country; being frequently, as in the French metropolis, and in the United States, accompanied by inflammation and ulceration of the glands of Peyer, and other characteristic phenomena, (*dothinenteria, typhoid affection;*) whilst in other countries, as in Great Britain, it exhibits itself more frequently by a distinct eruption, and absence of intestinal ulceration (*typhus*), and in certain localities, again, may assume an erysipelatous character, as in the adynamic fever, (*black tongue*), which in the year 1842 was observed epidemically in different parts of this country. The writer's opinion is affirmative; yet some pathologists regard them as distinct diseases, *ab origine*.]

2. Numerous and accurate observations have been made, particularly by Drs. Perceval, Cheyne, Grattan, and other Dublin physicians, Drs. Bateman, Tweedie, and others in London, and Andral, Chomel, and Louis, in France, confirming and extending those of Sydenham, on the more complicated forms of fever, in which the symptoms denoting or threatening local inflammation in the head, chest, or abdomen, combine themselves, either from the first, or at different periods during the disease, with those of the idiopathic fever; and it has been clearly shown that it is by no means exclusively with the inflammatory form of the general febrile symptoms—firm pulse, hot skin, &c.—that this combination may take place; but that, on the contrary, the danger in a majority of the worst cases of fever in this climate depends on a complication of local affections, with general symptoms, which, if standing alone, would as clearly demand stimulants.

The observation of such varieties in the general symptoms and in the local concomitants of fever is especially important when taken in connection with the varieties in the symptoms which, in the fatal cases, immediately precede death, the different *modes of fatal termination* to which different cases obviously tend, and the different kinds of practice which are, therefore, evidently demanded. When we see, for example, that some cases of fever are fatal within a few days of their commencement, with the pulse full and the skin hot almost to the moment of death, and headach and delirium, followed by stupor, as the most prominent symptoms; and that others are fatal only at the end of several weeks, the pulse being feeble, or very easily depressed, the skin cool or easily chilled, and the body wasted by inanition, or more quickly reduced by diarrhœa, for many days before death, but the head clear almost to the last; it becomes obvious that Dr. Cullen's memorable injunction, to form the indications on "the means of obviating the tendency to death in fever," must be followed by very different means. Perhaps the most systematic account of the different modes of fatal termination which are to be expected in fevers, and by the expectation of which the practice must be chiefly regulated, is to be found in the work of Hildebrand on Typhus.

3. The observations, begun by Sydenham and others of the older authors, on the comparative frequency and mortality of the different forms of fever at different ages, in different climates, different seasons, or in different epidemic visitations of the disease, have received many important additions.

The last-mentioned point is, perhaps, that on which it is the most important to have certain information. In the fevers of the hot climates, for example, it appears distinctly from numerous practical observations, that in some seasons the danger is chiefly from the rapid increase of symptoms denoting an inflammatory action at the brain and at the liver or stomach, headach, delirium, stupor, pain and tenderness at stomach, urgent vomiting, &c., and that these symptoms are safely and effectually met by full evacuations; but it seems equally certain that, on other occasions, and in the more malignant epidemics, the febrile depression is more formidable, the depleting practice less effectual, the danger of debility from it much greater, and stimulating remedies sometimes (though unfortunately seldom) obviously successful.

The present writer can say with confidence, from his own observation, that the fevers which were prevalent in Edinburgh from 1815 till 1820 were materially different in character from those which have prevailed since 1825; that at the former time the pulse generally preserved a greater degree of firmness throughout the disease; that when death occurred, it could be more distinctly ascribed to the inflammatory complications; that bloodletting was better borne, and seemed much more decidedly useful; and that the indications for the use of wine, and the benefit from it, were much less frequently seen. When the statements of Dr. Welsh on the fever of 1817-18 in Edinburgh are compared with those of other practical observers, either of former or later epidemics in Scotland, it will probably be admitted that the observation now made is in conformity with the experience of others. About the former period, several of the best observers, — Dr. Duncan in Edinburgh, Dr. Bateman in London, and many of the military and naval practitioners,—exerted themselves to show the safety and efficacy of bloodletting in fevers, even of the typhoid type; but in many of the fevers prevalent since that time, caution has appeared equally necessary in regard to bloodletting, and wine has seemed equally useful and important as in the days of Huxham or of Gilchrist. And it is only by such observations that we can be duly impressed with the importance of the practical cautions given by Sydenham, by Cullen, and others of the older authors, as to the importance of attention to *the nature of the prevailing epidemic*, in regulating our practice in fevers.

What has been said of the connection of fever with the local inflammations frequently attending it, may be applied likewise to the Contagious Exanthemata, in which there is a similar combination of general febrile symptoms, consequent on the introduction of a poison into the blood, with peculiar local inflammations chiefly of mucous membranes; but these are of a more definite character, both as to seat and duration, than in the former case. In these, likewise, a remarkable variety of epidemics, as well as of individual cases, has been repeatedly observed of late years; of which the peculiarly malignant or typhoid measles, prevalent in Edinburgh in 1807-8 and in 1815-16, were striking examples. The idea entertained by Dr. Watt and some others, of an increased mortality from measles compensating for the diminution of mortality in early life which had been effected by vaccination, seems to have been a hasty inference from the observation of such an unusually fatal epidemic, and has fortunately received no confirmation from subsequent experience.

The malignant Cholera, which has been the object of so much attention within these few years, has all the characters of a disease proceeding from a peculiar or specific poison, whatever the source of that poison may be. Many of its symptoms approach nearly to those of the congestive form of fever above mentioned; and the typhoid symptoms and strong tendency to stupor, observed very generally in this country in those who recovered from the stage of collapse, clearly indicate its analogy to the worst febrile epidemics.

It is obvious from what has been said, that much has been done in the last half century to increase the number and the precision of the data, by which we are habitually guided in the application to individual cases of this class of diseases, of remedies of known and acknowledged power, *e. g.* bloodletting, general or local, purgatives, nauseating medicines, counter-irritants, stimulants; and it were unreasonable to doubt that in this way the efficacy of medical treatment over these diseases, in the practice of intelligent and judicious men, has been gradually and considerably increased. We must ascribe much less to the peculiar efficacy of any new remedies recently introduced. The application of Cold in the early stage of Fever and of Scarlatina is one of those from which the most beneficial results have been anticipated, and the temporary efficacy of this remedy, and the safety of applying it during the stage of greatest vascular excitement, in the simpler or less complicated forms of these diseases, were ascertained by Currie and many others; but a careful observation of the "modes of fatal termination" of these diseases is sufficient to show that the cases to which this remedy can be safely and freely applied, are not, in general, those in which danger is chiefly to be apprehended; and it is probably to the conviction of this truth that we ought to attribute the gradual disuse of the most powerful method of applying cold in such diseases, the cold affusion.

The free use of saline medicines in fever has been lately recommended by Dr. Stevens and others, on the supposition that they have a peculiar or specific power of correcting the morbid state of the vital properties of the blood, which is indicated by its imperfect coagulation, and are therefore qualified to obviate the typhoid tendency in fevers; and it is certain that the indication which it is thus proposed to fulfil is one of real existence and importance, and that the effect of small quantities of saline matter in accelerating the coagulation of fresh-drawn blood, would seem to favour the idea of its power to correct that morbid condition. But it is a mistake to suppose that the mere reddening of venous blood by salts is an indication of any such change on the vital properties of the blood, as would be requisite to make their use effectual for the purpose in view; experience of the saline medicines in fever does not authorise our attributing to them any peculiar power over the typhoid symptoms; and although the saline injections into the veins have frequently had an extraordinary temporary exciting effect in the stage of depression or collapse of the malignant cholera, yet the very frequent accession of coma, after that copious admixture of saline matter with the blood, will hardly justify the hope of any improvement as to that most formidable part of the typhoid symptoms resulting from the saline treatment.

We must still admit that the only medicines to which we can confidently ascribe a peculiar or specific virtue of controlling the morbid actions which constitute fever are bark and arsenic, when used in the intervals of intermittents; and the improvement in the administration of the former medicine effected by the introduction of the Sulphate of Quinine into general practice by Pelletier

and other French pharmaceutical chemists, is one of the most important additions which chemistry has given to medicine during the period under review.

CHAPTER III.—*Recent additions to our knowledge of chronic diseases*—1. *Of organic diseases*—*Their diagnosis*—*Their arrangement and classification*—*Their connections with each other and with acute diseases*—*Their treatment*—2. *Of functional disorders*—*Their connections with one another*—*The general principles of their treatment*—*General reflections on the past history and future prospects of medicine.*

It will easily be understood from what has been already said, that some of the chief recent improvements in medical science will be found in the increased extent and precision of our information as to Organic Diseases, *i. e.* diseases dependent on permanent changes of structure in some of the organs. This department of medicine has likewise been studied with great care and minuteness by the French pathologists. It must be admitted that the diseases which are thus characterized are for the most part incurable; and that, most generally, it is only in so far as they are complicated, either with inflammation or with strictly functional disorders, that they admit of the application of any remedies of more than palliative operation; yet the knowledge of their existence is frequently of practical importance; and when the information which we acquire from studying their symptoms in the living body, and their appearance in the dead, can be connected with the investigation of their predisponent and exciting causes, and the mode of their formation, it may be usefully applied, even at present, and we may trust will hereafter become more extensively applicable, to the *prevention* of evils for which the past history of medicine gives us little reason to expect that any medical treatment will ever supply a remedy.

The most important additions made to our knowledge of this class of diseases may be mentioned under the following heads:—

1. The diagnosis of them, during life, has been greatly improved by comparison of symptoms, observed in many cases, with accurate investigation of the lesions discoverable on dissection. This, indeed, appears from what has been already said of the improved diagnosis of chronic inflammation and its effects, which, in many instances, are not to be distinguished during life, (otherwise than by their often abating, spontaneously or under remedies, more favourably,) from the more strictly organic diseases.

It is chiefly in the discrimination of chronic diseases of the thorax and abdomen, that the advantages of the methods lately brought into use may be observed. The observation of the functions which appear chiefly disordered is, certainly, in chronic as in acute cases, our first guide to the organ which may be judged to be affected; but this observation is sometimes deceptive, and often insufficient for such distinctions as may be confidently and usefully drawn. We now know that effusions, either into the cavity of the chest or into the air-passages, that morbid condensation or morbid rarefaction of the substance of the lungs, or the formation of cavities within them, all modify the sound emitted by the chest on percussion, or the resonance of the voice from it, or alter, or add to, the natural respiratory murmur, generally or locally; and so produce peculiar symptoms, which, when existing alone, may be recognised by most persons without much difficulty; and even when combined, as so frequently happens, with one another, still frequently enable us to judge of the nature of complex cases with a degree of precision formerly unattainable.

The existence of enlargement of the heart and of dilatation of the aorta, and of obstruction to the transmission of blood through the heart, is in almost all cases distinctly discoverable by manual examination, connected with a few facts easily ascertained, as to the sense of palpitation and the manner in which it is excited; in some cases, more specific information is obtained as to disease of the pericardium by percussion; and as to disease of the valves of the heart by the modifications of the natural sounds of the heart's action, perceived by auscultation; and the existence of aneurisms within the chest, otherwise imperceptible, may sometimes be ascertained in this way.

As an example of the increased precision of our knowledge of chronic diseases of the chest, we may instance the judgment which no careful observer will now hesitate to pronounce, on Dr. Cullen's definition of hydrothorax, comprising a number of symptoms which it is of great importance for the practitioner to observe, but none of which, singly or combined, do necessarily indicate that disease; and two of the most important of which, the starting from sleep with palpitation, and the sound of fluctuation in the chest, actually never attend the disease, unless it be complicated with others; while the symptoms most truly characteristic of the effusion into the chest, (the dull sound on percussion, and absence of respiratory murmur, altering their place on change of position,) are not mentioned in this definition at all.

It is true that much obscurity often attends the diagnosis of the more complex chronic diseases of the chest, even with all the aids that we now possess; and that to clear up this obscurity, in too many cases, would answer no practical purpose; but the statement that has been made of the improvements of diagnosis, as applicable to the simpler cases at least, since the time of Cullen, does not appear to be exaggerated.

It has been found that the existence of organic disease, giving an unnatural density to parts within the abdomen, may also be detected in some instances by aid of the sound emitted on percussion, (as practised by Piorry and others,) with more certainty than by the touch alone. Many organic changes of structure to which the different parts of the alimentary canal and the chylopoietic viscera in general are liable, have been carefully observed, and their symptoms (unfortunately some of them sympathetic and remarkably various) been recorded; and the discovery of the connection of organic disease of the kidneys with urine of low specific gravity and albuminous character, has enabled us to speak with confidence of the chief cause of derangement of the health in many cases which are otherwise ex-

tremely obscure. It is well observed by Andral, that organic diseases of the liver, when, as often happens, they are neither made known by enlargement of the organ, nor by jaundice, nor even by any obvious deficiency of bile in the fæces, are at present more obscure than those of any other important viscus. The organic diseases of the testes, the prostate gland, and the urethra in man, and those of the uterus and ovaria in women, have been subjected, of late years, to repeated and careful inquiry; the symptoms which may excite suspicion of them are known, and detection of them by examination is seldom a matter of much difficulty.

As examples of the increased precision given to our knowledge of the variety of organic diseases, we may mention the accurate descriptions of those of the eye by Ware, Travers, Lawrence, [Mackenzie,] and others in this country, as well as by many foreign authors; and, again, the minute discrimination of the diseases of the joints, as they originate in different textures, by Sir Benjamin Brodie; all which distinctions, in cases which are carefully traced from their commencement, may often be recognised.

2. Not only has much been done to enable us to pronounce, with more confidence than formerly, on the existence of organic changes of structure in various parts of the body, but the whole history of the changes which come under this description has been much elucidated by observation, both in the living and dead body.

Most of these depend on the deposition, and many ultimately on the ulceration, of adventitious or morbid matter of one kind or another, either substituted for or added to the original materials of the different textures; whether these are external and exposed to view, or internal, and to be recognised, partly by the functions which seem chiefly deranged, and partly by the modes of examination to which we have referred. From the time of Mr. Abernethy's Classification of Tumours, many minute descriptions of the great variety of these deposits have been attempted both in England and France, [and America,] to some of which we shall presently advert; but it is perhaps impossible to embrace all these varieties in any formal arrangement. Probably the most successful attempt of the kind is that now in progress by Dr. Carswell, which affords a good illustration both of the increased accuracy of our knowledge of morbid anatomy, and of the advantage which is taken of the arts of the draughtsman and engraver, to diffuse and perpetuate that knowledge.

We have already spoken of the important practical question frequently presenting itself, how far an inflammatory action produced by the usual causes of inflammation may be concerned in determining their formation, and how far they must be referred to mere "perversion of nutrition" from unexplained causes. This question frequently occurs, and may be answered nearly in the same terms as to every variety of morbid structure, from the simplest morbid cysts or hydatids up to bony concretions, and scirrhous or cancerous tumours; and the writings of Broussais, Laennec, and Andral, show the importance attached to it by modern French pathologists. All that can be said in regard to it in general terms is this, that effusions which are simply the effects of chronic inflammation, may produce, probably in any part of the body, effects and symptoms almost exactly similar to those which result from the deposition of morbid matter, and the growth of adventitious textures; and that effusions, in the first instance produced by inflammation, may probably be gradually converted in different cases into any such morbid growths; but it is obvious that some additional condition of the morbid state must exist in every case where such conversion takes place; and experience instructs us, that when that unknown condition exists, all sorts of morbid degenerations of structure may be gradually effected, without either the application of the usual causes of inflammation, or the appearance of its usual symptoms.

There are two general grounds of distinction among adventitious textures or morbid growths, which are of obvious and practical importance, and have therefore fixed the attention of many pathologists, but which are often not easily recognised in individual cases, and are evidently not in all cases strictly observed by nature.

The first is the distinction of the diseases properly termed *malignant* from those which either become inert and stationary, or tend, however slowly, to a spontaneous favourable termination. When a decidedly scirrhous tumour has formed in any part of the body, when a deposition of the nature of the encephaloid matter or medullary sarcoma has taken place, or when a sore has assumed the character of hospital gangrene, nothing but continually extending ulceration and ultimately exhausting constitutional disturbance can be expected; whereas the more common tumours, encysted or sarcomatous, on the surface of the body, polypi, of the common kind, on mucous membranes, fibro-cartilaginous tumours of internal parts, *e. g.* of the uterus, even the most common morbid depositions on the coats of the arteries, or valves of the heart, or in the substance of the liver or kidneys, although they may interfere with important functions, and so prove dangerous, are not necessarily destined in themselves to such unfavourable progress.

The other distinction is one which points to the same conclusion, both as to prognosis and practice, but by no means coincides with the former, between those organic diseases which are *constitutional*, and those which are strictly *local*. We apply the former term to those formations which are known by experience to be found very generally in different parts of the body at once, and particularly in internal parts at the same time as in external; the matter composing which has been found also, by Langstaff, Velpeau, and many others, in the blood within the vessels, chiefly in the veins leading from parts where extensive depositions have been going on, and of which it has been frequently observed that the removal of a limb, seriously affected by them, has been quickly followed by a rapid deposition of the same kind in internal parts. This character is so far applicable to the scrofulous tubercles, the whole history of which has been so fully elucidated by Stark, by Baron, Lloyd, [Gulliver,] and others in this country, and by Bayle, Laennec, Andral, Denis, Lombard, and others in France; but the latter particu-

lars above stated have been found to apply more uniformly to two other kinds of morbid or adventitious structure, accurately described and distinguished only within the present century, and which are formed in general more rapidly than the scrofulous tubercles, viz. the medullary sarcoma, encephaloid disease, or fungus hæmatodes, and the melanosis; the first of which varies considerably in different instances, and has therefore acquired the above and various other names from Abernethy, Hey, Wardrop, Burns, Farre, Monro, Tertius, and others who have described it within the last thirty years, in this country; while the latter is so very peculiar, that since it was described by Breschet, Laennec, and Béclard in France, and by Fawdington, Cullen and Carswell, and others in this country, there has been no difficulty in restricting the term to the proper description of cases.

In regard to these diseases, although we can point out several circumstances which seem to predispose to them, yet it seems obvious, from what has been very frequently observed in regard to them, that the circumstance which gives the strongest predisposition to the formation of any one of them in any part of the body, is the previous existence of the same morbid texture in another part, and that the chief cause of their formation is a constitutional peculiarity rather than a local irritation.

Many other kinds of morbid growths (particularly those which differ the least from the sound textures of the human body) have no such tendency to occur simultaneously or in succession in different parts of the body, and may therefore be more safely and advantageously removed in many instances where they have formed in external parts. The tendency to reproduction after the removal of an affected part is less uniform in the case of the scrofulous tubercles than of the other diseases now mentioned; but the great tendency to repeated deposition in internal parts is what, in fact, gives the great fatality to scrofulous disease, for individual tubercles are not uniformly destined to extension, or even to ulceration, and the epithet of malignant is, therefore, not strictly applicable to them. On the other hand, the tendency to reproduction after removal is very strongly marked in the true scirrhus after it has subsisted for some time in any part of the body, and particularly after any of the lymphatic glands have been affected by it; so that we must always expect that malignant form of disease, however strictly local in the first instance, to become constitutional shortly after it has discovered itself.

The facts stated as characterizing the constitutional organic diseases seem to leave little room for doubt that they essentially depend on alterations of the constituents and vital properties of the blood; and that the peculiar matter of which they consist is, at least to a certain degree, elaborated in the interior of the vessels, and forms part of the circulating fluid, if not from the commencement, at least in the progress of the disease. This principle is evidently illustrated by what has been already stated as to the evidence of purulent matter circulating in the blood in cases of inflamed veins, or of extensive suppuration of other parts. And the dependence of such local depositions on a morbid state of the blood is farther illustrated by the facts observed in regard to the singular disease lately called Purpura, but long since accurately described by Dr. Duncan, sen., under the more characteristic term hæmorrhœa petechialis; some cases of which, indeed, approach very nearly to those cases of melanosis where the morbid matter is most generally deposited.

The phenomena of Scurvy, strictly analogous to those of purpura, afford the only example yet known of an alteration of the vital properties of the blood, the essential cause and auxiliary predisponents of which are known, and the means of correcting which are equally simple and certain. The peculiar efficacy of the citric acid in particular, according to the statements of Sir G. Blane, seems well ascertained. But the absolute inefficacy of the same treatment in cases of purpura sufficiently indicates that similar conditions of the blood may result from various causes. Numerous recent observations on purpura have shown that it is often complicated with inflammatory diseases, and then may admit of relief from antiphlogistic treatment,—a conclusion quite in accordance with what has been stated as to other diseases connected with a morbid condition of the blood.

There is yet another description of organic disease in which it is pretty certain that the morbid product is the result of vital changes which take place among the constituents of the blood in the interior of the vessels, viz. some of the fungous growths or vegetations which are occasionally found attached to the valves of the heart. From several cases, which he has himself seen, the present writer has no hesitation in agreeing to the doctrine of Laennec, that certain of those substances are not growths from the lining membrane of the heart, but coagula of blood, gradually forming and attaching themselves, and acquiring a peculiar organization.

There are many cases of disease in which organic lesions of the solids composing the animal frame are effected without the deposition of new or adventitious matter,—cases of atrophy, or hypertrophy, or alteration of the form and position of parts, leading in many cases to derangement of functions, or giving still more unequivocal indications of their existence, by alteration of the outward appearance of the body. These cases have likewise attracted the particular attention of pathologists; and what is most important in this department of pathology is, the distinct apprehension of the manner in which (consistently with known laws of the animal economy) many of these alterations of structure are effected, in consequence either of inflammations and effusions, or of other organic diseases, or even functional disorders, previously existing. Thus, atrophy of parts may often be traced to their disuse, and hypertrophy to their excessive use, in consequence of other disease, and both illustrate the dependence of nutrition on local changes occurring at the extremities of the arteries. The emphysema of the lungs already mentioned, and the enlargement of the bronchi, are naturally consequent on many cases of bronchitis and effusion into the air-passages, but constitute, when effected, important organic diseases in themselves. In like manner the common case either of dilatation or hypertro-

phy of the heart, so fully investigated by Corvisart, Laennec, Bouillaud, Andral, Baillie, Burns, Farre, Hope, and many others, is very seldom a diseased state in itself, but is the natural consequence, produced in a healthy part by obstruction to the exercise of its function, of disease (inflammatory or organic) of one part or other of the membrane lining the inside of the heart and aorta. So, also, the expansion of the cranium and unfolding of the convolutions of the brain in the chronic hydrocephalus is a consequence of the gradually increasing effusion of serum in its interior; the gradual conversion of the kidney into a cluster of cavities, communicating with each other and filled with fluid, is the natural effect of obstruction of the ureter, causing enlargement of the calices, and compression and absorption of the glandular substance; and the great alterations in the form and other qualities of bones, both in the mollities ossium and in the spina ventosa, appear to be, frequently at least, consequent on morbid growths from their internal or medullary membrane.

3. Not only the history of most of the organic diseases has been greatly elucidated, but the more general consequences which they produce, the predisposition which they naturally give to other diseases, and therefore their connection with inflammations, with functional disorders, and with one another, have in many instances been made out; and in a practical view, this is one of the most important inquiries concerning these diseases in which pathologists have lately been engaged.

Thus it is now well understood that the very common disease of the arteries, which begins by deposition of lymph on their inner membrane, and generally goes on to ulceration and irregular bony depositions there, is naturally the great predisposing cause of many and very different diseases,—that in the trunk and extremities it often leads to aneurism, and in the extremities it is often connected with gangrenous inflammation; that in the brain it often leads to rupture of vessels and apoplexy or palsy; that in the neighbourhood of the heart, and especially when the morbid deposits extend to the valves of the heart, it obstructs the circulation there, and leads to dilatation and hypertrophy, to palpitations, to fits of syncope, sometimes to angina pectoris; that the obstruction on the left side of the heart gives a great predisposition both to peripneumony and to rupture of blood-vessels, producing hæmoptysis and apoplexy of the lungs, and seldom fails, sooner or later, to induce chronic bronchitis, with which, in certain constitutions, fits of spasmodic asthma are combined;—farther, that this as well as other causes of obstruction to the free flow of blood through the heart and lungs, producing habitual dyspnœa, leads naturally to congestion in the great veins, and thereby to enlargement of the liver; and that it is chiefly after the disease of the heart and arteries has already become complicated with disease of the lungs or liver, that dropsy, more or less general, is so apt to supervene. In like manner we can easily trace the connection, in many cases, of bronchitis and asthma with emphysema of the lungs and consequent habitual dyspnœa, and then with enlargement of the liver and dropsy;* or that of obstructed liver, first with dyspeptic symptoms, and then either with ascites, or with diarrhœa, dysentery, melæna, or hæmatemesis.

But in all these cases it is to be observed, that the pre-existing organic disease acts only as a great and permanent *predisposing* cause of the various derangements, functional or organic, which thus combine themselves with it. When existing alone, any one of these organic diseases may exist, at least in some individuals, for a length of time without causing any very urgent symptoms; and the occurrence of these complications may very often be ascribed also, in part, to the action of *exciting* causes of disease,—cold, intemperance, exertion, &c., and to inflammatory attacks connected with these. In fact it is chiefly by warning us of the specific dangers to be expected from such exciting causes, and of the importance both of avoiding them, and of watching for any fresh accessions of inflammatory symptoms, and using depleting remedies as early as possible to subdue them when they appear, that the knowledge of the usual successions of such diseases is useful.

4. The precision which is thus given to our views of the effects to be expected either from bloodletting or other evacuations in the varying circumstances of organic diseases, of the time when they should be used, the objects to be gained by them, and the circumstances in which no advantage can be anticipated from them, is certainly the principal practical improvement which has resulted from our extended acquaintance with the pathology of such diseases. In cases of dropsy, additional evacuant remedies, of the class of diuretics, particularly the digitalis and the pyrola, have been introduced within the last half century, and from the former, at least in many cases, very striking effects have been obtained.

Many hopes have been entertained, at different times, of the discovery of medicines possessed of a true and specific deobstruent or alterative power; but it must be admitted that these have been generally disappointed. At the same time it is probably going too far to say, in the words of Sir B. Brodie, that when any texture of the body has been altered from its natural condition by disease, that natural condition is never restored. We undoubtedly meet with cases where unexpected recovery from what appear to be the symptoms of unequivocal, although probably incipient organic disease of some of the internal viscera, takes place under the judicious use of mercury, or of the sulphureous and saline mineral waters, or of iodine; and we cannot regard the recommendations of these remedies and the rules for their administration, contained in many recent works, as practically unimportant, nor doubt of the introduction of the last-named medicine, by Dr. Coindet, having been a real addition to the resources of medicine. But it must be admitted that the virtues of all these remedies have been much exaggerated by most of those who have undertaken

* When disease of the liver has been found connected with organic or habitual disease within the chest, it has been often supposed, in this country, that the former has been the primary disease; but the present writer is quite satisfied that the statement of Andral, as to the pre-existence of the thoracic disease, in most such cases, and the mode of production of the liver disease, is very generally correct.

to recommend them; that in a great majority of cases they are obviously quite inadequate to the object to be accomplished; that when they have succeeded, the morbid structures which existed have probably approached more nearly than is usual to the effects of simple chronic inflammation, and been obviated in part by the repeated although cautious use of the ordinary remedies for inflammation; that some of these remedies have injurious effects on the body which are often just objects of apprehension, (of which mercury in scrofulous habits is the most important example;) and that, in the present state of our knowledge, the discretion of the medical practitioner is very often most usefully exercised in withholding any such remedies, and confining himself to palliative treatment only, in cases which are truly beyond the reach of any alterative or deobstruent medicines yet known.

Important practical observations have been made by Sir Benjamin Brodie and others, on the diagnoses of those organic diseases of more external parts, especially of bones and cartilages, in which counter-irritation has proved most successful; but these are perhaps rather to be regarded as cases of chronic inflammation and its consequences than of strictly "perverted nutrition."

This is not the proper place to dwell on the surgical treatment of those organic alterations of texture which admit of relief from such means; but the great improvements in the treatment of aneurisms, of strictures of the urethra, of polypi of the uterus, and the use of various escharotics to destroy the surface of intractable ulcerations, as in the case of the arsenical solution applied to the hospital gangrene, of the nitric acid to phagedenic venereal sores, of the lunar caustic to the more common syphilitic ulcers,—even of different escharotics to incipient ulcerations of the os uteri, are all examples of the successful application of expedients of this kind, the proper use of which was formerly imperfectly understood.

The last class of diseases which may be noticed in this sketch of modern improvement in medicine is that where the functions of different organs only are disordered, without either inflammation or fever, or organic alteration of structure; and although this class is very numerous, and demands much of the care of medical practitioners, it need occupy only a small share of our attention at present; because the disorders which it comprehends are less accurately defined, their history is more various, the effects of remedies upon them are more uncertain, and the observation of their effects is liable to more fallacies; so that the information which we can acquire in regard to them cannot have the same character of precision as that which we possess in regard to those diseases of which the symptoms and anatomical characters are better marked and more uniform. In some instances, however, merely functional diseases have been described and distinguished of late years with a degree of precision formerly unknown, and practically important.

The greater number of the functional derangements to which we here allude are included under the two heads of disorders of the digestive organs, and disorders of the nervous system; but some cases of dropsies unconnected with perceptible organic disease, some cases of derangement of secretion unconnected with digestion, and many chronic affections of the bronchi, and of the surface of the body, may be held to belong to this class, as being derangements of secretion rather than either inflammatory or organic diseases.

Now it may be remarked of these diseases, that perhaps the most important general principle lately ascertained in regard to them, is that of the sympathetic connection existing among them, and, therefore, the possibility of effectually correcting one disorder of this class by applying remedies, apparently, to another. Thus the dependence of many disorders of the nervous system on imperfect digestion, and derangements of the bowels, not as the sole, but in many instances as one of the conditions of their existence, seems well established; and it is generally believed that the same principle extends to disorders of distant secretions, (*e. g.* to that disorder of the secretion of urine on which the formation of calculi depends,) and to many chronic cutaneous diseases. The Treatise on Purgative Medicines, by Dr. Hamilton, senior, and the Essay on the Constitutional Origin of Local Diseases, by Mr. Abernethy, have strongly impressed the practitioners of this country with the importance of careful attention to the state of the primæ viæ in many cases, where the organs chiefly affected appear to be distant from that source of irritation. It may be doubted whether the remedies which have appeared so useful in the hands of these practitioners have always acted merely in the way they supposed; it may be doubted, for example, whether the purgatives used by Dr. Hamilton in chorea, in hysteria, or in threatening of hydrocephalus, have acted merely as evacuants of irritating matters from the bowels, or chiefly as *derivants* from the brain and spinal cord; it may be doubted whether the small doses of mercury prescribed by Mr. Abernethy in cutaneous ulcerations and other disorders of external parts, have acted merely on the stomach and bowels, or chiefly as alteratives on the whole system; and it is certain that in different states of the primæ viæ, different plans of treatment from those chiefly insisted on by those authors, will be found most effectual. Still, the general principle of correcting the functional disorders of other parts of the body, by the diet, regimen, and medicines, which most effectually improve and preserve the state of the digestive organs, is generally acknowledged as highly useful and important.

Another important observation lately inculcated by several practical authors, is that of the ready transition of functional disorder, when neglected or irritated, into inflammation, generally of the more chronic character, and the importance, therefore, of the antiphlogistic treatment in a number of cases, which, judging at least by their first symptoms, might be supposed to present no indications for loss of blood, or even for low diet. The writings of Dr. Cheyne and other recent authors on hydrocephalus, of Dr. Parry, of Dr. Wilson Philip on dyspepsia, and of Broussais and his followers, afford many illustrations of this observation; and as usual, when a principle previously neglected has been illustrated, this kind of practice has been carried too far by the last mentioned authors.

The attention of the profession has been properly fixed by several practical authors of late years, on certain forms of disorder of the nervous system, which were not formerly distinguished with sufficient accuracy, and which demand the more attention as they often closely resemble the inflammatory diseases of the nervous system, although the most successful treatment of them is very different from that which true inflammations require. The Delirium Tremens, so accurately described by Pearson, Sutton, Armstrong, &c.,—and the power of opium, [and even of large quantities of alcoholic liquors,] under proper management, in controlling it, is the most striking example. The accurate investigation of cases of spectral illusions and somnambulism or reverie, is likewise of modern date. We may mention, also, the careful diagnosis of neuralgic pains, and the use of some remedies, of the class commonly called tonics, such as the carbonate of iron, recommended by Mr. Hutchinson and others, in their treatment; the dependence of many such disorders on morbid action at the roots of the sensitive nerves of the parts apparently affected, (which seems to be ascertained by the observations of different authors on what has been termed Spinal Irritation); and more especially the important observations of Dr. Marshall Hall, Mr. Travers, and others, on a state of excitement, resembling inflammatory fever, in certain constitutions, to which they have given the name of Reaction after the Loss of Blood; and again those of Dr. Abercrombie, Dr. Gooch, and others, on the symptoms closely resembling hydrocephalus in children, which are consequent on long-continued diarrhœa, or other evacuations, and abate under the use of stimuli.

It were tedious to enumerate the different individual medicines which have recently been proposed and approved by many practitioners in strictly functional diseases; but it seems important to remark, that the advantages to be derived in many chronic disorders unconnected with organic disease, from change of scene or of climate, from residence in the country, from the vegetable alteratives, as they have been called, such as the sarsaparilla, and from the saline, sulphureous, and chalybeate mineral waters, have been more fully appreciated of late years than formerly; and there is good reason for thinking that such remedies and regimen, acting primarily, or at least most obviously, on the organs of digestion, may often be effectual, not merely in correcting functional derangements, but in so restoring the natural vital properties of the blood, as to obviate the predisposition to organic disease, which might otherwise be gradually formed.

On the whole, in taking a general view of the different stages of improvement of medical science, it may be stated that the ancient physicians, entertaining the most inaccurate notions as to the functions of the body in the sound state, and as to the essential nature of diseases, were yet enabled, by empirical observation, to acquire a surprising extent of accurate information, as to the external causes and natural progress of diseases, and as to the power of remedies over their most formidable symptoms. In more modern times physiologists have acquired a general knowledge of the nature of all those functions in which the visible movements of the body are chiefly concerned, and so far contributed to the elucidation of many diseases; while the distinctions of the different diseased states, so far as they appear during life, have been ably arranged and classified in the systems of Nosology; the application of remedies to them has been reduced to a more regular system than formerly; and the lists of really efficient remedies have been gradually curtailed, and their properties more accurately determined.

The great improvement of late years has been chiefly owing to the more diligent cultivation of morbid anatomy, whereby the localities, the varieties, and the natural effects (whether perceptible during life or after death,) of almost all the diseased states of the body have been more accurately ascertained. At the same time, by the improvements in physiology, the immediate causes of the fatal termination of diseases have been in most cases explained; and thus the immediate objects to be attained by medical practice have been more clearly defined, and additional precision given to the administration of remedies, the powers of which had been already established.

In looking forward to the farther improvement of the art, we can hardly expect that the most numerous class of remedies, — those which produce sensible effects on the body, — can either be made to exert more power, or be directed with much more accuracy towards the objects which they are capable of accomplishing, than they may be at present, by well-informed and judicious practitioners. Our hopes of the increasing usefulness and efficacy of our art must depend, partly on the improvement of medical education, and the more uniform diffusion, through the members of the profession, of the knowledge which we already possess; but partly, also, on the progress which may yet be expected in two lines of inquiry, in which our success has been as yet only partial,—*first*, in the discovery of Specifics, which may counteract the different diseased actions of which the body is susceptible, as effectually as the cinchona counteracts the intermittent fever, citric acid the scurvy, or vaccination the small-pox;* and, *secondly*, in the investigation of the Causes of disease, whether external or internal; *i. e.* of the conditions under which, either the vital actions of the solids, or the vital properties of the fluids of the body, become liable to deviations from their natural state.

That the vices, and follies, and necessities of mankind will, throughout all generations, be a fruitful source of disease, as well as of other misfortunes, is as certain as that an origin of moral evil has, for mysterious purposes, been implanted in every human breast; but there is nothing irrational or Utopian, or inconsistent with the past progress of human knowledge, in the hope that

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* [It is to be regretted, that one so philosophic in his general views as Professor Alison should encourage the search after "specifics," which has been the occasion of more empiricism, in and out of the profession, than any other fallacy. Not one of the agents, which he has named, is entitled to the epithet. They are all prophylactics, whose action is explicable on general principles, and none of them are capable of neutralizing or relieving the very complaints for the prevention of which they are employed. The writer is not aware of a single specific in the lists of the materia medica.]

our knowledge of the causes and intimate nature of diseases may be gradually so extended, and our powers of resisting them so increased and defined, that human judgment and foresight may ultimately be found adequate either to prevent or relieve all the sufferings, which we now regard as necessarily attendant on our physical constitution; and therefore, the defect of those moral qualities, rather than ignorance of the laws of nature, be justly chargeable for all, as it already is for many, of those physical evils which it is the office of the physician to alleviate.

W. P. Alison.

MEDICINE, PRACTICAL, PRINCIPLES OF.—In the article Disease was necessarily presented to the reader a long catalogue of evils, which, however, man has not been left unprovided with the means of meeting or of combating; some of them he has been enabled to mitigate, and others have quite disappeared before his increasing knowledge and skill. In the same manner as beasts of prey and venomous and offensive reptiles lose their ferocity, or recede in all parts of the earth, and finally disappear, before the advancing civilization of mankind, so, also, it would seem, do the diseases which prey upon health and life become modified by the resources of man's ingenuity, or disappear before his discoveries and growing wisdom; and when philosophers perplex themselves concerning the origin of evil, they little suspect how many of the physical as well as moral ills of humanity are destined to disappear before the sagacity, the research, and the enlarged virtue of the species. The great kingdoms of nature have each already and amply contributed to reward human industry by remedies for the maladies of men; placing within man's power various substances which taken in certain quantities, or externally applied, produce beneficial effects on the frame when it is labouring under disease; that is to say, when its functions are disordered, or the structure of its parts is changed or impaired. Experiencing the effects, also, man has learned how to avoid many of the causes of disease. His reason to a great extent protects him; and would do so more effectually but for the force of habits formed before his reason acquires strength. By regulating the impressions made on the body and mind by some of the actual agents of disease, he has even converted them into occasional remedies; and, the practice of medicine becoming more comprehensive in its scope, and no longer confined to the administration of drugs or to the mere *cure* of maladies, has so far advanced as to include the means of preserving health unbroken in a great variety of circumstances, by which the mind and body are liable to be temporarily affected in the course of life.

These agents of disease have already been spoken of, as being external to the body or inherent in it: the air which surrounds it; the food which supports it; the exercise which promotes all its actions; the sleep which, after labour, refreshes it; the mind which governs and directs its voluntary actions and ennobles it; and all the inherited or congenital peculiarities to which it is liable, as well as all the accidents to which it is exposed in its progress from the helplessness of infancy to the second helplessness of old age.

When by the undue impression of any of these agents their morbid effects are produced, such effects consist of disorder in some of the corporeal actions, of which the secondary results have been pointed out as very various. If there is, first, some increase or some decrease of the energy of the nervous or of the vascular system, exhibited in one function, in more than one, or in all, there follow changes in the structural condition of the parts affected; whilst new formations seem produced by peculiar modifications of action, distinct from mere depression or augmentation of vital power. Certain laws of sympathy, of relation, and of conversion, have also been detected, which were comprehended in our general notice of disease; and by reasoning from the evident object of some morbid actions, an attempt was made (professing, certainly, little novelty) to establish the probable final cause of all.

If any endeavour to attain to general principles in medicine be thought worthy of encouragement, they must be sought, it appears to us, by pursuing the route thus marked out; by a review of the causes of disease, and of the forms which it assumes; of the results to which it leads, and of the general objects to which it tends. It is agreeable to believe that medicine is now cultivated by many labourers in a spirit so philosophical, that the young student who falls into the vulgar error of considering such a general view superfluous, may confidently be told that he will live long enough to see and to regret his mistake.

Before the forms and products of disease had been so minutely investigated as to admit of being detailed with any approach to exactness, the ancients were led, by the simple observation of the *causes* of disease, to adopt natural measures for restoring the equilibrium of a function disturbed. If a man became ill from exposure to a hot sun, he was cured by a cool regimen; and if from exposure to cold, a return to health was promoted by warmth, and sometimes by mere insolation. If too much food disordered him, he was relieved by abstinence; if too much exercise or labour had exhausted him, he was renovated by rest. Thus *contraria contrariis medenter* became one of the first maxims, or one of the first general *principles* in medicine. As knowledge advances, the general principles of treatment acquire a wider and a firmer basis; but this first principle, to which the ancients in their regulation both of treatment and regimen paid especial regard, has in some periods of medical history been departed from with disadvantage, and sometimes, and even recently, been utterly denied. The wise physicians of Greece saw nothing unreasonable in the belief that when the system was disturbed by a burning fever, the body was struggling to produce coolness; and when they beheld the frame shaken with a chilling ague, they concluded that an effort was making for that restoration of bodily warmth which they found to follow the cold fit: nor, probably, was their conclusion incorrect. Without neglecting these observations, the modern physician has much more to do. He endeavours to ascertain in what consist the first movements of nervous or vascular disorder, and in any disease presented to him, what actual change is already produced, and what further is threatened; so that his

measures may be properly directed, and with a promptness proportioned to the occasion; for he has not only to remove effects obviously induced and existing, but to check, suspend, and stop the less palpable actions out of which the structural mischief grows.

He knows that there is in many or in all functional disorders, and even in some which have gone on to the production of structural change, a tendency to salutary terminations. In the paroxysm of an intermittent, he can admit that the successive stages seem intended to effect the quiescence in which they terminate. Deep-seated abscesses, for instance in so large and important a viscus as the liver, show in their progress a tendency to seek or form communications by which the purulent collection may be carried away with safety. Almost all, perhaps all, the irritations of phthisis are the concomitants of an effort, always going on, for the riddance of the lungs from them; and the most deplorable changes in the course of schirrhous affections appear to be but the attempts of nature to break up or to separate from the body a portion so peculiarly diseased that its continued attachment to the system is inconsistent with the continuance of life. Admitting that these are the best means of relief which the laws of disease allow, and seeing, in too many melancholy examples, the inefficiency of the laws to the salutary end proposed, he cannot but draw the conclusion that *art* was intended to step in and supply what is wanting; and that it may often direct the actions thus originated, and sometimes most beneficially counteract them by others artificially excited. To know when to do this is an essential part of the wisdom of practical medicine, and a knowledge of the means of doing it is another of equal importance.

As a general rule it may be stated, (and the highest authorities might, if necessary, be quoted for it in every age of medicine,*) that wherever it can be safely done, the natural tendency to cure, supposing it to be evident, is to be followed. In very slight disorders no benefit arises from interference. A slight cold, or a slight diarrhœa, for example, will cure itself by the discharge which constitutes one of the first of the effects of the disorder. A slight hemorrhage, or a slight external inflammation, may also be left to itself; but for a more violent or continued hemorrhage, although its object be apparent and salutary, we must substitute means which are capable of giving equal relief, and are at the same time more under our control. A more severe inflammation, also, or even the slightest, if seated in a part not exposed to sight, can seldom or never be permitted to proceed uncontrolled; because inflammation seldom terminates without some product which may excite secondary inconvenience,—in other words, seldom terminates simply in what is called resolution, but either, when continuing, or when it attains a certain vehemence, ends, by a necessity arising from the laws of disease, in copious effusion, or in suppuration, or in the thickening or other alteration of parts, or the agglutination of opposite surfaces, or in ulceration, or mortification; the inconvenience or the danger of which effects, in the head, the chest, the abdomen, or the articulations and extremities, are such that art must be vigorously employed to arrest the progress of the first functional disorder, and prevent the advance to those new formations or structural changes which, albeit they are natural methods of cure, are methods inconvenient and incligible, or unsafe.

But it often happens that in the functional disorder, the disordered action is too violent, and will not be altogether suppressed: in these cases our efforts are limited to its moderation, and to conducting it to the least dangerous or least inconvenient termination that circumstances will permit. If effusions or suppuration cannot be prevented, their extent may be limited, or their escape facilitated; and if structural change cannot be altogether prevented, means may be found of saving a considerable portion of the suffering organ, so that its natural function may remain but slightly impaired.

When medical aid is sought for at a period too late to secure these advantages, and morbid actions have passed, unrestrained, into their ordinary effects on structure, medicine yet has its principles and resources. Circumstances have changed, and measures must be adapted to them. If effusion has taken place, as in various forms of dropsy, its absorption or its removal may be effected; if suppuration, its discharge, and sometimes its absorption; if structural change, its gradual repair or its removal. The resources are not always efficacious, but they always deserve a trial. Even when promising to be most successful, the frame is irritated by the presence and persistence of the disease, the strength of the body is reduced, and life is endangered. This irritation must, if possible, be allayed, the debility guarded against or removed, the danger to life averted. Whilst these indications are pursued, some new disease may be excited, or some of the *conversions* of which we have spoken (see Disease) may take place. The supervention of a new disease,—for instance, of pleuritis or phthisis,—always demands prompt attention; the conversion of the original disease into another is occasionally salutary; that is to say, when the new disease is less dangerous than the old, and entirely takes the place of it, as in the case of an affection of the skin supervening on disease of some internal organ. It is a very common object of art to produce this kind of conversion. Even a febrile disorder of the constitution has sometimes been considered capable of producing curative effects: Celsus enumerates among the accidental circumstances which cure the sacer ignis, *a day's fever;* "medicamentum ejus fortuitum est, uno die febris, quæ humorem noxium absumat;" (lib. v. cap. 28, s. 4,) thus adding the theory of the cure also. The authority of Hippocrates may be quoted to support a similar fact concerning convulsions dispersed by fever; and even epilepsy removed by the supervention of an intermittent; and Bartholinus and Salmuth are quoted by Hoffmann to the same effect. Hoffmann adds that he has often observed the convulsions produced by worms put an end to when a febrile action had destroyed the worms; considering the attendant fever as a salutary process set up to rid the body of the worms, effecting its pur

* Medicinæ leges naturæ legibus debent esse consentaneæ. Felix medicatio cui adjutrix natura succurrit, irrita vero quæ repugnante natura tentatur. *Fernelius*, in præfat. lib. i. See also *Hoffmann*, vol. iii. s. 2.

pose either by heat or by producing acrid bile.* Even chronic glandular disorders, which are perhaps generally exasperated by any febrile disorder, sometimes have disappeared, and old enlargements of the glands have seemed to be removed by an absorption induced by the fever attendant on measles.†

In all these instances, if we admit the facts without cavil, and in any other instances in which it may be thought salutary to excite any degree of fever, it can only be understood that certain circumstances accompanying the febrile state, certain conditions of the extreme vessels and nerves, are the causes of any benefit that is obtained. It must generally be more desirable to induce the same condition, if practicable, by other means,—by medicines which can affect the capillaries or the ultimate nervous actions without producing a concomitant fever; and this, we shall see, is another principle of practical medicine. By some of the older physicians, as by Van Helmont and Campanella, the disposition to regard fever as always a curative effort led to the mischievous doctrine that by all means the fever should be increased by calefacients and tonics. (See *Baglivi*, De Praxi Medica. lib. i. cap. xii. sect. 2.) This is one among many instances in which a correct principle has been hurtfully perverted; and the remains of this prejudice only disappeared in the memory of practitioners yet living.

If medicine could be so directed as to reach the first link in the chain of diseased effects, deep-seated and often hardly discernible, in the nervous and vascular systems, and to which the term *proximate cause* has often been applied, the treatment of mere symptoms would become but a small part of our duty. It is to this point that the efforts of enlightened medicine constantly tend. Whilst we try to relieve pain, we carefully seek for the diseased action of which it is a symptom; and, not content to allay the pain by destroying acuteness of sensation, seek to remove the diseased action, that a permanent cure may be effected. If we desire to suppress the immoderate evacuations of diarrhœa, we carefully consider what particular state of the intestinal canal occasions the disorder; and in such a case inconsiderate and empirical practice, never successful except by chance, may even be fatal. To attempt to remove the effusions attendant on chronic pleuritis or peritonitis, without regarding the continuance of the inflammatory disease, or to attempt to counteract the prostration of strength in a fever by other means than removing the febrile state, would be so exclusively to attend to mere symptoms, as to follow methods of treatment most inefficient and unsuccessful.

Yet it arises from the defective state of our pathology, combined with our anxiety, and even with our duty, to relieve the afflictions of the sick, that we are often glad to treat symptoms only; and sometimes it would appear, that when prominent symptoms are removed, the disease is at an end. As we can generally see and act upon the symptoms, although we are oftentimes unable to penetrate to the primary disordered actions, it happily follows that the limitation of our knowledge concerning the causes of disease does not determine the limits of our practical power, or always produce uncertainty or inconvenience. To the philosophical inquirer, however, it will always be unsatisfactory to be unable to account for some of the principal achievements of medicine; as the cure of an intermittent by bark, of syphilis by mercury, and of scabies by sulphur. In each of these cases the curative means are employed with singular confidence, and with general success; in each we see the grounds of hope that there are, even now, undiscovered remedies of equal efficacy in other maladies; yet, in each case, to speak candidly, it would be presumption to attempt an explanation of the mode in which the methods employed produce their marked and salutary effects.

To meet the complications of disease, the principles of treatment must often be equally complicated: two or more simple principles being not only simultaneously acted upon, but respectively modified by the existing circumstances of morbid complication. Chronic inflammation may exist with effusion, and both with debility; and although the principal indication or principle to be followed is in such a case to put an end to the inflammation, respect must be had to the existing debility, and relief from the mere effusion must neither always be postponed until the difficulty of acting on first indications is overcome, nor attempted without regard to the original cause or to the actual strength of the patient. There may be unequal growth, redundancy, or hypertrophy, in one or more portions of the frame, deficiency in others. General plethora may be combined with general debility. In these and numerous other complications, the principles of cure, being two-fold or three-fold, demand more from the practitioner than lectures on books can inculcate; a discriminating wisdom which must partly depend on his organization, and partly on his attention to the instructive examples afforded by daily practice.

Structural change is always preceded by disordered function, and the principles of treatment which are the ordinary guides of practice have reference to the means of restoring functional regularity. Disordered function consists, we have said, (Art. Disease,) of, 1, vascular disturbance or irregularity, producing local or general excess or defect of sanguineous supply; 2, nervous disturbance or irregularity, producing local or general excess or defect of nervous energy; 3, of combinations of these disturbances, producing various affections of nutrition, secretion, absorption, evacuation, muscular motion, or the sensorial offices, or the intelligence and will.

The modes in which we attempt to control these morbid states, and re-establish natural actions, would seem, then, very obviously to be such as tend to equalize the vascular and nervous actions, simply or conjointly, and in every degree of their functional combination; in other words, to excite or depress, to stimulate or to allay, in every case, as each case may require. In the

* Ipse quoque compluries observavi, motus convulsivos ex vermibus, accedente febre vermibusque per æstum vel bilem acrem enectis, sponte cessasse. Opera omnia, vol. iii. sect. 2, cap. 1. *De optima naturæ morbis medendi methodo*, sect. xxv.

† Dr. Forbes has communicated to us a striking fact of this kind.

practice of surgery, or rather in the medicinal means employed in external affections, we can generally recognise these simple principles; and when to stimulate and when to lower is acknowledged to be so compendious a surgical principle as nearly to include every other. In the treatment of such cases as fall under the physician's care, the principles are, we apprehend, equally applicable, although their simplicity is in some degree hidden by the variety of the phenomena, the frequent obscurity of their origin, and the number of the constitutional and local means employed. If this be so, the Brunonian doctrine erred less in its principle of dividing diseases into two great classes, than in the application of the principle to the actual arrangement of diseases, and in not admitting the simultaneous existence of states compounded of and exemplifying both the divisions.

Admitting the great difficulty of determining in what precise manner medicines produce their least doubtful effects, we plainly observe how both vascular and nervous excitements are sometimes lessened by *evacuants*, general or partial; by general or local bleeding, by purgatives, diuretics, and diaphoretics; and how the evacuant plan is supported by the auxiliary one of diminishing the supplies introduced into the system. It is equally clear that we try to rouse both the vascular and nervous systems by *stimulants*, including various agents exerting a more or less durable tonic power on the contractile forces, or on the digestive function, or directly on the nervous system, or on the vascular extremities on the internal or external surfaces. Several of the agents employed in certain circumstances as general evacuants are local stimulants, which in other circumstances are used simply as such; those, for instance, which excite the bowels, the kidneys, the uterus, or the skin. In some instances even venesection, the most direct evacuant, has the effect of a stimulus, by removing some oppression, as in apoplexy; in other cases, as of nervous excitement connected with vascular disturbance, it is a direct sedative; and in certain states of fever a brisk purgative, by its effects on the intestinal surfaces, acts as a stimulant to the whole system. We are also possessed of means of allaying inordinate actions by medicines which do not act as evacuants, by *sedative* applications. Opium and other medicines of this class are daily employed as auxiliaries to bleeding, and as means of restraining violent muscular actions, or irregular and profuse secretions, or sensations too acute, or mental excitement so great as to be incompatible with repose or with reasonable mental acts. The same substances, in smaller doses, are sometimes used as stimulants; and as irritation is often connected with debility, all stimulants may sometimes be said to act as sedatives. All that belongs to a knowledge of the ordinary properties of medicines of different kinds or in different doses may soon be known; but the great art of medicine (expressed in a well-known and often-quoted saying of Boerhaave,) is the application of the proper medicine in the proper dose at the proper time.

Both in cases requiring evacuants or stimulants, and also in cases of long-continued disorder of any function or organ, leading to structural changes and new formations, the employment of evacuants, of stimulants, or of sedatives, may be so regulated as to produce gradual alterations of action, to suspend actions which are morbid, or to restore, or excite, or regulate actions which are only disturbed. When thus employed, the medicinal means are called alterative, and they have already been spoken of under the head of ALTERATIVES.

There can be no doubt that the operation of medicines prescribed with these intentions is contemporaneously exerted both on the nervous and the vascular system, and generally by a primary influence on the functions of digestion and assimilation.

Besides the general effect of medicines as stimulants, evacuants, or sedatives, they commonly possess, as we have seen, a power of acting locally, from which, in many instances, even their general operation is obtained: the various purgatives act with greater or less energy on particular portions of the intestinal canal, some on the duodenum, some on the colon and rectum, and yet all may be employed as evacuants. But there are a few medicinal substances which seem to exert a still more especial influence on particular parts of the body: it may, perhaps, be said that iodine especially stimulates the absorbent and glandular system; there can be no doubt that the secale cornutum singularly stimulates the muscles of the uterus, and that the strychnine exerts the same power over the whole system of voluntary muscles. We are content therefore to employ these agents empirically.

In a great variety of cases, and for a great variety of purposes, external irritants are employed; to aid in checking acute diseases, and to suspend those which are chronic; to relieve local internal plethora; to free internal parts from painful disorder; to disembarrass, as it were, in some cases, the constitution from superfluous or morbid humours, and prevent their specific irritations of glandular or other tissues. In the familiar instance of cynanche tonsillaris it may often be noted how the scarlet colour of the fauces, with the swelling and other appearances of inflammation, disappear as soon as a blister has been applied with effect to the throat; the relief being plainly attributable here to a simple transference of action. The cough and some of the other symptoms of phthisis are generally, although but temporarily, relieved whenever a pustular eruption is produced on the chest by the antimonium tartarizatum applied in the form of ointment; and this suspension of symptoms is the result, perhaps, of a transference of irritation from the bronchial mucous surface to the skin, rather than of any suspension of the disease itself; although it is often sought to suspend the actions of diseases themselves by similar means, or by setons and issues. When the new actions induced by counter-irritation produce relief from pain, the effect may either be ascribed to a transference of irritation, inducing an altered condition of the nerves, or to the discharge of humours from the circulation, which in such cases were productive of nervous irritation, as in others they seem to be of all the disordered actions of the scrofulous constitution.

As the advantage obtained from alterative medicines appears to be derived through their influence on the functions of digestion and assimilation, and by their general operation on the nervous and vascular system; so, on the other hand, it may sometimes be observed that medicines of great power are singularly modified in their effects by the state of the body at the period of their administration. In the latter case, all the operation of the medicines seems happily directed to a specific movement or alteration in the part of the system particularly affected, and their usual effects on the system at large are placed in a state of abeyance. Calomel, and opium, and wine, have been given to an enormous extent in tetanus, and sometimes in other affections, without salivation, or mental elevation, or oppression. In certain states of nervous irritation, very young children have taken, with advantage, opiates in doses which would have been destructive to them in a state of health. The same observation has been made in the case of adults affected with calculus; the quantity of opium given in such cases having sometimes been governed solely by the relief afforded, and yet producing no effect on the system in general. (Parr's London Medical Dictionary, article *Calculus*.) In hydrocephalus, the power of sustaining immense quantities of calomel has been ascribed to the peculiarly insensible state of the nervous system; but the same power is occasionally seen in cases of croup, although certainly in the latter affection the debility produced by large quantities of mercury sometimes becomes a serious consideration on the decline of the original malady. To these illustrations may be added that afforded by the tolerance of large bleedings, of calomel, and of opium, in inflammatory disorders in general, and of the tartar-emetic in pneumonia especially.

The best approach to the general principles of practical medicine, and the most convincing illustrations of their authenticity, are to be gained by reflecting on the intentions of all the usual parts of practice in the most common examples of disease.

Taking the example of *fever*, the most general morbid affection of the frame, we may perceive that the intentions acted upon are sometimes to check the first depression by direct stimulants and tonics, which is chiefly, if not solely, practicable in fevers of an intermittent type. When excitement supervenes on the first depression, we seek to allay it by evacuants, acting either on the mucous and cutaneous surfaces, in the shape of purgatives and diaphoretics, or on the whole system, by venesection. We lessen the quantity and stimulating quality of the food. When inflammatory actions arise, to these means are added local depletion, or local evacuation, and sometimes sedatives, as the application of cold, or the combination of opium with calomel; and very frequently we resort to some of the forms of counter-irritation: all these means being varied according to the seat of the inflammation. After a certain period the febrile actions decline, the different organs are left in a state of weakness; even the inflammatory affections which still linger behind seem connected with debility: and now we resort more freely to tonics and stimulants, medicinal and regimenal. Throughout the whole course of a disease, various in its forms, in its symptoms, and uncertain in its results, there are certain plain rules for our guidance, few in number, drawn from the existence of certain states of increased, or diminished, or irregular actions at the time. The principles are not obscure, but it is still their wise and timely application which constitutes a good practitioner. In following, for instance, that apparently plain indication of giving tonics or stimulants in the stage of debility consequent on fevers or other maladies, not only is it necessary to commence their administration with exact attention to the proper time for so doing, but delicately to apportion our attempts to the existing strength; according to the ancient and sage maxim, that *debilibus debilia, valentibus valentiora conducunt*, a rule which was supported by John Hunter, when he maintained the principle of not "increasing the action without giving real strength," and that we should always have regard to "the balance which ought to subsist between the power and action of every part." (Treatise on the Blood, &c. Introduction.)

In the course of a fever we find the most remarkable exemplifications of the effect of mental derangement; certain states of the mind seeming to increase or moderate the symptoms of a disease to which they also increase or lessen the predisposition.

There is a very important *sedative* appliance, the effect of which is never so universally observable in fever; although it is not to be overlooked in any affection; namely, *repose* of the affected or disturbed organ. With as much care as the surgeon takes directly to impede the undue use of maimed or diseased extremities or parts of the body, should the physician forbid or obviate the undue exercise of the whole muscular system in a fever; and not only of the muscular system, but of the system of circulation and the nervous system. It is, indeed, in some degree with this view that he inhibits a full or stimulating diet; but he must also prevent, as much as possible, the access of all external circumstances which excite the senses, the mind, the volition, and the locomotive forces. The benefit of this kind of repose in a fever is always in proportion to its extent. In slighter maladies, its use needs no illustration.

In the treatment of *inflammations*, not originating in the state of fever, the same principles are followed; active evacuations during their active stage, combined with various sedative means, sometimes opium, sometimes the tartar-emetic, which, although an evacuant when employed, after the old method, in small doses, is a sedative when given to the extent common in modern practice, and particularly, as has been mentioned, in pneumonia. The chronic forms of inflammation, like those in the latter period of fevers, are sometimes combated by stimulants, external or internal, and these may be simultaneously employed with some local forms of evacuation, and also with sedative agents; the emptying of distended and disordered vessels, the excitement of the vessels themselves, the strengthening of the body, and the expulsion of morbid humours, all requiring to be attended to.

The importance of local applications, both internal and external, is seen to be very great. Even

in acute inflammations they are highly serviceable auxiliaries, and in chronic affections they are often alone equal to effecting a cure. Whilst by general bloodletting and other evacuants we seek to lessen the quantity of circulating fluid, and to lower the energy of the heart, by local means we still endeavour to alter the state of the capillaries; and in cases in which neither general evacuants nor general stimulants are required, local means applied to the internal or external surfaces may perhaps effect all that the case requires. Such is the result of daily experience; and the fact is consistent with the physiological character of the capillaries, the powers of which are to a certain extent independent of the heart; insomuch that they are even exerted for a time after all communication between the capillaries and the heart is cut off. The application of leeches, of blisters, of friction, and of cold and warmth to the body, amply illustrate the action and the utility of local measures in inflammations, in fevers, and in various local affections: and in other cases, diuretics, purgatives, expectorants, emmenagogues, are used with a design of obtaining specific local actions, which are often excited with equal certainty and advantage.

External applications include the various forms of bathing, which may be so ordered as to answer in different cases the purposes of a stimulant, of a sedative, or of transferring vascular and nervous excitement to external from internal parts. (See Bathing.) The use of fomentations is equally applied to all these purposes, to stimulate inactive parts, or to allay pain and inflammation.

When it is the object of our practice to relieve a patient from the inconveniences or threatened dangers of *plethora*, the reduction of the quantity of circulating fluid is in ordinary cases the plain indication or principle which we keep in view; and this we attempt to pursue by direct evacuants, bloodletting, and purgatives which stimulate the capillary extremities in the intestines to the evacuation of fluid; perhaps, also, by diuretics and diaphoretics, which act in a similar manner on the kidneys and skin. These indications may become combined with that of giving tone to the containing vessels; or, more commonly, with that of guarding some particular organ from the effects of determination or congestion; and we fulfil the latter indication by local depletion, by the sedative action of cold, by establishing artificial discharges, and by warning the patient against hurtful exercise or postures. Whilst we try by these means to diminish the quantity of fluid already existing in the body, and to avert its evil consequences, we are careful to cut off the supplies, by a proper regulation of the quantity and of the quality of aliment; and we debar the patient from solid or fluid stimulants which would counteract our evacuating plan. In some cases of congestion, as of the skin, or of the abdominal viscera, the admission of medicinal or dietetical stimulants, and of external stimulating applications, may constitute a part of the indications.

In all the approaches to *anæmia* and to *atrophy*, our principles of proceeding are totally different. To supply proper food, and by cautious attempts to rouse or stimulate the powers on which the digestion and assimilation of that food depend, not only demands every resource of medicine, but the judicious application of the air as a means of renovation, and the careful avoidance of evacuants which would destroy the feeble remains of vitality.

In combating the *profluviæ*, we have to counteract the increased discharge by stimulants which act on the too much relaxed extremities of the capillaries, or we have to lessen the determination to them by new modes of evacuation, or we have to remove their state of congestion by local depletion instead of permitting the evacuating discharge to proceed uncontrolled; and external means are sometimes employed to assist one of these kinds of indication and sometimes another: the direct removal, also, or allaying of the irritation of the capillaries, whether directly or sympathetically excited, is often had recourse to, and by the use of sedatives.

In the case of *suppressed secretions*, whatever may be the cause of the suppression, our means of relieving and removing the disorder are still either vicarious evacuants, or stimulants, or sedatives. Take the periodical uterine discharge as an example. Its suppression is sometimes cured by bloodletting or by leeches; sometimes by purgatives; sometimes by local, sometimes by specific, sometimes by general stimulants, as tonics, exercise, change of air, and diet; and sometimes by sedatives, which remove irritations of the affected organ incompatible with functional regularity.

In violent *nervous disorders*, where at first sight it might appear that our principles of treatment were more numerous, it is found on examination that they are only more complicated than in common cases. In epilepsy, in hysteria, in mental disorders, whether the cause is in the brain itself, or in its blood-vessels, or in some other organ, the means of cure are but the means of evacuation or of stimulation, or of allaying morbid movements, general or local, immediate or remote, occasional or habitual.

In the case of *morbid formations*, and in that of *scrofula*, we attempt to control evident disordered actions in the nerves and blood-vessels, actions not easy to be defined, by diminishing or by increasing the supply of blood or of nervous energy sent to them, by allaying irritations, and by setting up new and controllable actions to oppose and suspend the old.

Hereafter, in these instances of morbid formations, as in those of calculi and of poisoning, very material chemical principles may enlarge our views of practice, and add to our means. These are at present extremely limited, and chemical medicine, of which Paracelsus may be said to have been the founder, is yet in its infancy; indeed it is yet very doubtful if any instances of the successful application of chemistry to medicine can be cited; the chemical medicines, so called, which are employed in cases of calculus, or of simple gastric acidity, not appearing to act as direct chemical agents, but by their influence on the organs of digestion. Yet the detection of some fluid ingesta in the blood, and in the urine, as well as the direct influence of atmospheric air on the blood, are facts sufficient to defend chemical therapeutics from the imputation of extrava-

gance; and we cannot but be of opinion that the improvement of medicine will, during the next century, proceed much in that direction. More accurate investigation of the fluids in a state of health will lead to a fuller acquaintance with the changes effected in them by disease, and it is not forbidden to us to hope that more direct means may eventually be discovered of checking several diseases than we have yet ventured to suppose the existence of. This probability, however, has been recently disputed; the chemists, on the one hand, being accused of expecting too much from their science, and the physiologists, on the other, reproached with a neglect of chemistry. Dr. Thomas Thomson of Glasgow, a chemist of the first reputation, and a man of great knowledge and great wisdom, expressed himself on this subject in the following terms, in a work published a few years ago :—

"I need not observe to those gentlemen who have paid attention to the subject, that by far the most likely means of improving physiology is a cautious application of chemistry to the investigation of the different constituents of the human body. An accurate knowledge of the chemical composition of every organ, and of the alterations produced on that organ by disease, would probably throw new and unexpected light upon the nature and treatment of many diseases. Physiology hitherto has been handled almost exclusively by the anatomists. These gentlemen have acted with a zeal and industry that cannot be too much admired.* * * * * A new and more subtile species of anatomy remains still to be applied. Where the labours of the anatomist terminate, those of the chemist should begin. This chemical investigation of the animal body may be just said to be commencing at present; for it was not till the atomic theory was brought to considerable simplicity and perfection, that such an investigation was possible. It is easy to see that it must contribute prodigiously to the advancement of physiological knowledge."*

More recently, Dr. Prout has expressed himself in terms more sanguine: and to the controversy which ensued between this distinguished pathologist and Dr. Wilson Philip, a physician who stands peculiarly characterized by the philosophical spirit with which he has cultivated physiology, pathology, and the practice of medicine, the reader might with less hesitation be referred, if the discussion had not provoked more discourtesy than should ever be shown by great improvers of science, to whom truth alone should be of any real consequence.† All parties and all authorities will, we believe, at least concede that chemistry may and will prove a valuable auxiliary to physiology and to pathology; and that its subsequent application to the treatment of diseases may not unreasonably be expected. No one will be found, we imagine, to contend that chemistry will ever explain every thing in physiology, or that the practice of medicine will ever rest on chemical principles alone.

[Of late, increased attention has been paid to chemistry, owing to the researches in organic chemistry of Liebig, Boussingault and Dumas, and others; but they do not modify the inferences expressed above.]

There is much reason to believe that the advantage derived from medicines in some states of disease arises from the changes they effect in the intimate elaborations carried on within the blood-vessels, and of which the products are the various healthy and morbid secretions. Such would seem to be particularly the case in the instance of specific inflammations; and the same is very probably true as respects several or all of the morbid formations. The disposition of a scrofulous constitution towards the formation of tubercles is probably connected with as definite a change in the character of the blood as that which more palpably, and by general acknowledgment, exists in chlorosis and in scorbutus, in some fevers, and in the Asiatic cholera. In many of these cases, as well as in colica pictonum, and in the tremours produced by exposure to mercurial fumes, it cannot at present be decided how far the supposed sanguineous detriment exists, or if existing, to what extent it is combined with, or even dependent on, injury of the nervous system.

In several disorders which the pathologist unhesitatingly admits to be nervous in their character—in tic douloureux for example—the cure by specific modes of treatment seems to depend on some change wrought in the condition of the nerves or nervous system itself different from mere sanguineous excitement or congestion, and different from deficient supply of blood. The whole subject of nervous pathology is in great obscurity. It is possible that the minute ramifications of the several nerves may possess various properties as distinct from and to as great a degree independent of those of the larger nervous masses as are some of the functions of the capillaries from those of the heart; and a knowledge of such properties, if existent, must be preliminary to any near approach to correct principles of treatment in nervous disorders.

A few medical applications require to be separately alluded to, as being employed on mere mechanical principles;—demulcents in irritations of mucous passages; some of the anthelmintics, as the filings of tin; and various emplastra, when the intention is to give support to subjacent or neighbouring parts. None of these require further observation.

The principle of treatment sometimes recommended in chronic and obstinate diseases, and spoken of in the article disease, that, namely, of producing some strong impression or commotion of the system, in the hope that the system may, in such an artificial and general disturbance, rectify or *right* itself, might, in different cases, produce its advantages by acting on the nervous or on the vascular system, or on both. As views of treatment become more and more understood, such treatment, however, will be less and less resorted to; and if sudden and violent measures should be thought desirable in lingering states of disorder, the principles of their application and use will be better comprehended. It may be observed

* An Attempt to establish the First Principles of Chemistry by Experiment. By Thomas Thomson, M. D. Regius Professor of Chemistry in the University of Glasgow, &c. &c. Lond. 1825. Introduction.

† See the Report of Dr. Prout's Gulstonian lectures, and the whole controversy, in the Medical Gazette for 1831; also a paper in the same volume by Dr. Stevens, on the Treatment of Malignant Diseases.

that much of the success of irregular practitioners seems no less to depend upon this principle than that part of the benefit often ascribed to the use of various mineral waters arises from the general change of diet, regimen, and habits of life, with which a temporary residence at watering places is almost in all cases accompanied. The principle by which these circumstances effect favourable changes in the health seems especially deserving of consideration, both in such cases of chronic disorder as are connected with morbid conditions of the nervous system, including those which especially and in various degrees affect the mind; and in all diseases which depend upon, or which have induced, an altered condition of the blood.

Careful consideration will generally show, even in chronic, and obstinate, and anomalous maladies, some clear indications to be followed for the relief of the patient; and in the cases in which any expectation of a perfect cure is to be indulged, the means of effecting it can hardly ever be wanting to those who can reasonably entertain the expectation. The very principle on which relief seems sometimes to be obtained by changing the habits of the patient in many particulars, may perhaps be found, if inquired into, to be resolvable into that of removing some unexpected cause of irritation, which removed, digestion and assimilation, and the proper distribution of venous and sanguineous energy are restored, and the balance of health is regained. The *means* of relief will still be found to have been something which has imparted power or stimulus to overcome the morbid obstacle, or something which has directly allayed some morbid irritation; or, lastly, something which has produced a delayed or much required evacuation of some morbid material, or something which has improved the state of the blood. The principle of relieving long-continued ailments by attention to the digestive organs is spoken of by Dr. Heberden in his Commentaries.* It has of late years gained much attention in this country, and still more on the continent, insomuch that practitioners have not been wanting who have ascribed every possible disorder to primary digestive derangement. A direct improvement of the blood is a very probable consequence of such a plan, and various ameliorations of nervous and vascular actions may follow, or may only accompany this change.

The first *principles* of practical medicine, then, are few and simple. In a work every article of which is an illustration of those principles, we need not dwell longer on the principles themselves. It may almost be said, employing the words of Hoffmann, that there is no other method of cure, and that there should be no other intention in the physician, than to reduce to order the actions and excretions when not in a natural state; and that all kinds of medicines do but this, to allay actions which are excessive, and excite or promote and equalize those which are depressed and obstructed.† But the *means* of fulfilling these indications are very various; and if the judgment of the practitioner is exercised in their application, so their increase and diversified combination afford equal scope for his ingenuity and invention. Departing from all rational principles, physiological or pathological, the physicians of the middle ages vainly sought some universal medicine which should accomplish every varied indication at once. Such dreams have long ceased to be indulged in, although some base pretenders yet insult the public sense by professing them; and the only hope of attaining to principles of universal application depends on the gradual improvement of our knowledge of all the actions of the body in health and disease. The principles of medicine, not dependent solely on a doctrine of solidism or of the humours, lead, therefore, to no extreme and exclusive practice; and the influence of the moving powers is admitted without excluding just views of their solid and fluid results. The mutual dependences of the nervous and vascular energies, and the properties of and changes effected in the blood, being all taken into consideration, we admit nothing but what is known, and wait for further explanations from the constant progress of all the sciences connected with medicine.

From early infancy even to extreme old age, the few principles now enumerated seem at present to be the constant guide of our art in its attempts to rouse, to regulate, or to appease, actions insufficient, or too disorderly, or too energetic, to be consistent with comfort, with freedom from uneasiness and pain, or with the maintenance of health and strength of body or of mind. In all the varieties of their application, the object is to restore healthy actions as soon, and with as little waste of strength, and with as little suffering as possible: or, as a fashionable physician of ancient Rome was in the habit of professing to do, *cito, tuto, et jucunde:* and where a cure is out of the power of our art, the same principles lead to means of relief by which life is made comfortable for a long period, during which the patient if left to nature would be consigned to misery. The time *may* come, when, guided by yet undiscovered knowledge, and new and more direct principles, the tendency to tubercular and other morbid formations may be surely checked; chronic inflammations readily cured; and fever suspended in its first movements. But the day of these triumphs is yet distant.

Hoffmann mentions it as the first criterion of a man skilled in the medical art, to know "*cur et quare* hoc vel illiud alimentum ad valetudinem conservandam morbosque sanandos salutare vel minus tale sit dicendum;" and he quotes with deserved praise the eulogium of Thuanus on Hollerius, a famous physician of Paris, who by constant meditation had so improved his judgment, that he often cured those ill of such deplorable maladies as the other physicians of the time, "riding rapidly through the streets," (per vicos vaga cursitatione mulos fatigantibus,) knew little or nothing about. We may confidently recommend to the student the diligent perusal of the works of the admirable

* De Ratione Medendi. See also *Baglivi*. In chronicis pauca remedia requiruntur ——— semper tamen in morborum diuturnitate consulendum est digestionibus. Animadv. Pract. Nov.

† Neque aliam dari medendi viam, vel etiam medentum debere esse intentionem, arbitramur, quam ut motus et excretiones, a naturali statu desciscentes, in ordinem reducant. Omnia enim remediorum genera id tantum præstant, ut vel nimis auctos motus sedent ac moderentur, vel depressos et impeditos excitent, promoveant et rursus æquales reddant. *Opera omnia*, Præfat.

physician whom we have here and already more than once quoted in this article. His learning and admirable good sense, the liberal spirit in which he viewed all parts of medicine, his discrimination as regards the innumerable controversies existing in his time, his wise direction of the medical practitioner's mind to things concerning which the senses could give information, things useful and about which men could speak reasonably,—"quæ in sensus incurrunt, quæ usum habent, et de quibus evidens ratio constat et dare potest,"—rather than to subtile disquisitions relating to things more obscure;—these and many other merits have not only endeared his name to learned physicians, but to liberal scholars, from the time when his writings appeared to the present day. Notwithstanding the subsequent undoubted advancement of medicine, there are few pages of his voluminous works to which the practical physician may not yet refer with advantage.

The number of writers in whose publications any specific notice of the abstract principles of medicine is to be found, is not very great. We do not mention writers professedly on the practice of medicine, whose works are like the separate articles of this work, *illustrations* of principles. Many valuable observations occur in Baglivi, (Opera Omnia, Lugd. 1733), and many ingenious ones in Cabanis, (Du Degré de Certitude de la Médicine); the works of M. Broussais, amidst much false and much doubtful theory, contain views and principles both original and important. In Dr. Heberden's Commentaries will be found a sensible chapter, De Ratione Medendi, and another in Dr. Gregory's Conspectus Medicinæ Theoreticæ, with the same title. Dr. Burne made it the subject of an excellent oration delivered to the Medical Society of London a few years ago, and since published. And we may mention, that in the Outlines of Pathology, just published by Dr. Alison, the English reader is for the first time presented with so clear, condensed, and comprehensive a view of the whole subject of *disease*, as can hardly fail to lead those who read it with care and reflection to a knowledge of the principles by which their practice should be regulated in all diseases.

At the same time, no reading nor reflection can make a good practitioner. Like an able orator, he must add to all the rules of his art daily habit and practice. His mind must be continually presented even with *numerous* examples and illustrations to guide and assist his judgment, and to correct the errors of reasoning on a practical subject. The symptoms of disease may be well understood and remembered, and the general principles of practice; but the treatment of diseases comprehends a multiplicity of details, essential or indispensable to the cure, and yet which easily, or almost inevitably, escape the memory of him who, although thoroughly grounded in the principles of medicine, is not continually exercised in prescribing for the sick.

The great utility of teaching by examples, selected at the bed-side, or by what is called clinical teaching, so long neglected in this country, and for the introduction of which we owe so large a debt of gratitude to Rutherford and Cullen, begins to be universally acknowledged. The full benefit of this admirable method will be the inheritance of another generation. A long existing defect in this respect has doubtless obscured the principles of practice, and in many instances quite shut them out of the practitioner's view during his whole life.*

But, if so engaged and so prepared,—by the principles already mentioned, and by others hereafter to be discovered, or by additional means of fulfilling the indications of medicine, the practitioner of the medical art has the privilege of feeling assured that he is useful; and the art itself, thus guided, and in every stage of its imperfection even to its final advancement, will continue to be of most singular service to mankind; relieving the sick, to use the expressions of Hippocrates, from the greatest of evils, from diseases, from pains, from sadness of mind, and from death.

By no one circumstance, we would add, will the practitioner find himself more assisted in his practical efforts, more enriched in practical resources, and better able to command them in all emergencies, than by the cultivation of a sincere and anxious desire to relieve his patients from whatever physical evils oppress them:—in all the varieties of his practice, no other feeling will so surely and so happily stimulate his mind.

J. Conolly.

MELÆNA.—This name (*μέλαινα νοῦσος*, the *black disease*,) was adopted by Sauvages from the writings ascribed to Hippocrates, to designate a genus of disease which he defines, "Alvifluxus materiæ nigricantis, atro-rubræ, dejectione aut vomitione frequenti notatus;" and this is the sense in which it is generally employed by modern nosologists and practical writers. We mean, therefore, by melæna, the occurrence, *as a symptom* in any disease, of very dark-coloured, grumous, pitchy, often highly-fetid evacuations by stool, commonly joined with sanguineous vomiting; or we use the word *as the name of a disease* in which such evacuations, with or without vomiting of blood, constitute the characteristic symptom. In these two senses authors speak of *symptomatic* and *idiopathic* melæna; but even where the latter phrase is with most propriety employed, the hemorrhage may generally be traced to some constitutional disorder or local organic disease as its primary cause. It has been mentioned in the article Hæmatemesis, that there is so close an affinity between that disease and melæna, that often they are not easily to be discriminated. Hæmatemesis is properly an hemorrhage from the mucous membrane of the stomach, and is *chiefly* characterized by vomiting of blood: melæna properly consists in hemorrhage from the mucous membrane of the small membrane, and is *chiefly* characterized by the dark evacuations by stool which have just been described. But as

*For an account of Dr. Cullen's clinical teaching in Edinburgh, the reader is referred to Dr. John Thomson's recently published life of Cullen. Every pupil of the great school of Edinburgh must rejoice to see the reputation of one of its greatest founders, and one to whom practical medicine is so immensely indebted, placed in its true light by a man of learning and science, and rescued from the superficial criticism in which it has of late years been too much the habit of a certain class of writers and lecturers to indulge when mentioning Dr. Cullen's practical works.

these two symptoms very frequently concur in the same case,—as blood poured out by the stomach is often carried downward into the intestines, and blood effused in the duodenum may pass upwards through the pylorus into the stomach; and as, moreover, these two hemorrhages are so much akin to each other in their seats, their causes, pathology, and treatment, a distinction between them is not always easy, and is seldom practically important. There exists, however, sufficient distinctions between them in all these respects to make it proper to treat of them separately in a system or a dictionary of medicine.

Synonymes. Μέλαινα νοῦσος? (*Hippoc. de Morbis*, lib. ii.) Morbus niger; Fluxus spleneticus; Melæna splenctica (*Sauvages*); Secessus niger (*Hoffmann*).

The description of the μέλαινα νοῦσος by the author of the treatise "On Diseases" ascribed to Hippocrates, is rather a matter of literary curiosity than of any practical importance. It is in the following words, translated as literally as the English idiom will permit:—

"The patient vomits black bile (μέλαιναν), resembling lees of wine; at other times a matter resembling blood. Sometimes the matter vomited resembles the *second* wine, (οἶνον τὸν δεύτερον, that obtained by putting the grapes into the wine-press:) sometimes it is like the ink of the cuttle-fish; sometimes it is acid, like vinegar; sometimes it consists of saliva and thin phlegm; sometimes of greenish bile. When the black blood-like matter is vomited, it smells like putrid or sanious blood (δοκεῖ οἷον φόνου ὄζειν). The fauces and mouth are scalded by the acrimony of the vomit; it sets the teeth on edge, and effervesces with the earth on which it falls; (this is probably the meaning of τὴν γῆν αἴρει.) When the vomiting is over, temporary relief ensues; but the patient cannot bear either emptiness or fulness of the stomach, the first causing flatulence and acid eructations, the latter a sense of weight at the præcordia, and a feeling as if the breast and back were pricked with sharp instruments. There are aching pains of the sides; a slight fever; the sight grows dim; and the patient is unable to stand. His complexion turns dark-coloured, and he becomes emaciated." Such is the description of the disease: the treatment it is unnecessary to give at length, even were it possible to render it faithfully. As far as we can understand it, it consisted in purgatives given frequently, (φάρμακον πιπίσκειν θαμὰ,) emetics, (φαρμακοποσίας τὰς ἄνω,) and afterwards venesection, if not forbidden by debility; a diet of whey, milk in the proper season, and whatever is cooling and laxative, excluding sweet, oily, and rancid articles; emollient clysters, if required on account of costiveness; a great quietude, and regularity of regimen. "If these things be done," adds our author, "the disease, as age advances, is removed, even if it remains in the habit till old age. But if the skin assumes a dark hue, it (quere, the colour or the disease?) will continue till death."*

* *Hippocrat. περὶ νούσων*, lib. ii. ad finem. Opera, p. 486, edit. Foësii, Genevæ, fol. 1567. The writer of this article has had the kind assistance of a friend distinguished by his philological attainments in revising the above translation. The last passage is scarcely intelligible, but seems to indicate that the disease in question is one of a very chronic nature and slow of removal; ταῦτα ποιεῖν· καὶ ἅμα τῇ ἡλικίῃ ἀποφεύγεται καὶ ἡ νοῦσος, εἰ καὶ καταγήρασκει σὺν τῷ σώματι· ἢν δὲ μελανθῇ, συναποθνήσκει. The two other diseases, called ἄλλη μέλαινα νοῦσος, and σφακελώδης (νοῦσος) have nothing to do with our present subject.

It is remarkable that the above description contains not a word respecting the black discharges by stool, which, with Sauvages and the moderns, characterize melæna, though this sympton (ὑποχωρήματα μέλανα, δκοῖον αἷμα) is often mentioned in other parts of the Hippocratic writings.

Hoffmann treats at considerable length of hæmatemesis and melæna, the latter of which (vomitus cruentus *cum secessu nigro*) he considers by far the more dangerous form of the disease, and identical with the morbus niger of Hippocrates. (Opera Omnia, tom. ii. p. 214.)

Sauvages introduced the name of melæna to denote this particular disease. He makes it a distinct genus, and assigns to it several species, some of which appear to be founded on observation, if not on correct pathology; others are hypothetical and fanciful.

Although Cullen has omitted melæna in his catalogue of diseases, he gives some account of it in his "First Lines," principally with reference to its pathology.

Morgagni, Haller, Lieutaud, Tissot, (Epist. ad Zimmermann. Epistolæ Medico-Practicæ, 12mo. Lausannæ, 1782,) but especially Portal, (Mémoires sur plusieurs Maladies, tom. ii. pp. 129, seq.) have, among continental writers, mainly contributed to advance our knowledge of the history, pathology, and treatment of this disease. The series of cases and dissections recorded by Portal are particularly worthy of diligent perusal.

In the publications of our own country, Dr. Francis Home, (Clinical Exper. and Hist. p. 127,) Dr. Marcard, (Edin. Med. Commentaries, vol. iv. p. 203,) and more recently Dr. Brooke (Irish College Transactions, vol. i. p. 124,) and Dr. Cheyne (Dublin Hosp. Reports, vol. i. p. 259,) of Dublin, Dr. Ayre, (On Marasmus, pp. 113, 117, first edit. 1818,) and Dr. Belcombe, (Med. Gazette, vol. iv. p. 109,) have recorded instructive cases and dissections of this disease. But there are few subjects in pathology which stand more in need of fuller and more careful investigation.

General history and symptoms.—Melæna, as well as hematemesis, so generally occurs as a symptomatic affection, that a description can hardly be framed which shall embrace all the various symptoms by which it is accompanied, according to the various causes which produce it. A much better notion of these will be gathered from a perusal of the cases above referred to, especially those so admirably detailed by Portal, than from any general description. The following may, however, be taken as a comprehensive view of the usual course of what has been termed idiopathic melæna.

The patient has for a considerable time shown symptoms of progressive constitutional disorder; the functions of the stomach have become debilitated; those of the liver and the bowels are imperfectly and sluggishly performed. The countenance has assumed a sallow, dusky, or "leaden" hue; the adnatæ of the eyes have become dull or

greenish; the tongue is furred and clammy, or more or less dry; the breath often tainted. The pulse is habitually frequent, or is periodically accelerated towards evening; in other cases it is intermitting and irregular; and there are palpitations of the heart, or a pulsation at the epigastrium. The symptoms altogether are those of aggravated dyspepsia, to which are often superadded those of visceral congestion. On examination of the abdomen there is to be felt a circumscribed enlargement of general tension and fulness in one or more of the abdominal regions; sometimes also tenderness to the touch. Upon the occurrence of any exciting cause of hemorrhage, an attack of melæna is induced, which is most commonly, but not always, accompanied by hematemesis, and at any rate with the same or very analogous symptoms. After complaining of much præcordial oppression and anxiety, tensive pain of the hypochondria, or dull pain at the scrobiculus cordis, with nausea, general uneasiness of the abdomen, and more or less tormina,—together with the common hemorrhagic symptoms of giddiness, coldness of the extremities, a tendency to faint, &c.—the patient is suddenly seized with vomiting of dark-coloured blood, together with a discharge, by stool, of blood of the same appearance, or more frequently of a very dark and often extremely fetid semi-fluid mass, of the consistence and colour of tar. Sometimes this discharge by stool occurs without any vomiting: it is invariably accompanied by great faintness and exhaustion. Occasionally the black matter discharged by stool is mixed with blood of more unequivocal appearance, or with dark-coloured bile, which may be distinguished from the former by dilution with water; which brings out a yellowish or greenish tinge. In some comparatively rare cases, the matter discharged by stool and vomiting is of a sooty blackness, (οἷον πόλυπον θολὸν, Hippoc.) has no smell, and assumes neither a bilious nor sanguineous tinge on dilution with water: this appears to be the true *melanosis* of the ancients. For some time after the cessation of the hemorrhage the patient remains in a very weak and precarious state, extremely liable to its recurrence, and requires to be carefully watched. Even after the attack appears to be entirely over, a predisposition to its return remains, and unless this be overcome by medical treatment, or by the resources of the constitution, it will in most cases ultimately prove fatal.

Appearances on Dissection. — Although a considerable number of dissections of patients who have died of this disease have been recorded, the subject is one which stands in need of much further investigation with a view to a satisfactory pathology of the several varieties of melæna and hematemesis. It is sufficiently established, by the researches of Portal, Andral, and other morbid anatomists, that no lesion of the mucous membrane of the stomach and intestines, except in some very rare cases, is to be met with in cases of gastric and intestinal hemorrhage. (See HEMATEMESIS.)

In a few cases partial reddening, softening, and oozing of dark-coloured fluid (similar to that discharged during the disease) is stated by Portal to have been observed in the villous membrane of the bowels. Morgagni records a case where the whole tract of the intestines was found "horribly inflamed." But much more frequently no trace of disease is discovered in the stomach and intestines; these organs have on the contrary been found remarkably pale and exanguious, (*Morgagni*) while marks of congestion appeared in the turgescence of the mesenteric and gastric veins, loaded with dark-coloured blood. (*Portal.*) Chronic enlargement or structural disease of the liver and spleen has been found in cases where the symptoms had led to suspect them to exist during life. It is highly desirable that in future investigations not only the state of these viscera be most carefully examined, but also the condition of the circulating system, and especially of the heart and great vessels, morbid alterations in which have only of late begun to attract a proper degree of attention, as causes of venous congestion and of *passive* hemorrhage.

Causes.—The predisposing and exciting causes of gastro-intestinal hemorrhage have been pretty fully considered in the article HEMATEMESIS, and therefore it is not necessary to prolong the present article, by recurring at any length to this part of the subject. Organic disease, a cachectic or greatly debilitated state of the constitution, sedentary employment, intense anxiety and close application to business, and a full and stimulating diet, with neglect of air and exercise, are the most usual predisposing causes, to which must be added fretfulness and irascibility of temper. These causes are most apt to induce a predisposition to melæna in males about the age of forty-five or fifty, in females about the time of the cessation of the menstrual periods. The exciting causes are those which occasion hemorrhage in general, as intemperance or any kind of excess, but especially any violent mental emotion or struggle, and none so frequently as a burst of passion. This has often induced not only a first attack of melæna or hematemesis, but the same cause has given rise to its recurrence at several times, when the patient seemed to be going on favourably, and to the final catastrophe, by bringing on a last and fatal attack. This is well illustrated in Portal's first case, (that of the botanist Aublet,) and furnishes a most important caution as to the *moral* management of patients who are predisposed to, and especially who have already suffered from this disease. Irritating and drastic purgatives are well known to occasion bloody stools, when injudiciously employed, and sometimes when given with every proper precaution: but they can hardly be supposed to induce a true attack of melæna, unless where a great predisposition exists.

Varieties of Melæna. — It is important in melæna, as in hematemesis, to distinguish with as much accuracy as possible the varieties which exist in the disease, or the *species* into which it may be distinguished, according to the nature of its causes, the kind of constitution in which it occurs, and the series of symptoms which precede or accompany it. It is evident that on such discrimination alone, a rational pathology or judicious therapeutical system can be founded. The fullest and most accurate enumeration of these varieties which has yet been made, is that of Portal. (Op citat. p. 211.) His species are the following:-

1. melæna supervening in *acute* (continued) fevers; 2. preceding, accompanying, or following intermittent fevers; 3. supervening on strong mental emotion, cases of which are so common; 4. following suppression of hemorrhoids or other habitual evacuations, and especially supervening on the cessation of the menses; 5. depending on the effect of gout upon those organs in whose substance the vena portæ is ramified; 6. that arising from scurvy, whether from this disease occasioning, as it often does, congestion of the spleen and liver, or from an alteration in the quality of the blood; 7. occurring in dropsy, either from the compression produced by the fluid effused in the abdomen, or from the accompanying organic disease of the liver, spleen, and other viscera. This division is evidently not strictly pathological, but it is much preferable to that of Sauvages, and may be useful to those who have leisure and opportunity for a further investigation of this very important subject. Portal illustrates each of his proposed species by reference to his own cases, and to some instances furnished by other authors. Pinel's division into species, of hematemesis, (Dict. des Sciences Médicales, art. Hématemèse, tom. xx.) (under which he comprehends melæna,) may also be consulted with advantage, but not implicitly adopted. Dr. Mason Good's division of melæna into two species, (melæna *cholæa* and melæna *cruenta*,) appears captivating by its simplicity; but he is evidently mistaken when he professes to derive it from Hippocrates; and moreover he starts with a generic definition totally at variance with the usual acceptation of the term melæna, and which seems to rest wholly on the dark hue of the skin, the only circumstance common to melæna, (the melæna *cruenta* of Good,) and the green jaundice described by Dr. Baillie, (his melæna *cholæa*.)

Pathology.—This branch of the subject has been in a great measure anticipated in the article Hematemesis. It may, however, be useful to take a brief review of the opinions which have been adopted respecting the nature of melæna by pathologists. The notion universally entertained before the time of Hoffmann and Morgagni, was that melæna depended on a flow of *black bile*, or of dark venous blood (for these terms seem to have been almost convertible, *bilis atra*, *melancholicus humor*, *fæx sanguinis*, &c.) from the spleen, which was supposed to be its great reservoir, into the stomach and intestines, through the veins called vasa brevia. The latest supporter of this opinion was Van Swieten; but it is not very easy to understand what he means by *atrabilis*.

According to Hoffmann, melæna consists of a true hemorrhage from some of the viscera of the abdomen, most commonly from the small intestines; but in conformity to the notions of his time, he conceived that this could only take place by the *rupture* of a vessel. He therefore supposes that the branches of the meseraic veins ramified on the inner surface of the ilcum are ruptured in consequence of impediments to the return of the blood through these veins, in hypochondriacal and hemorrhoidal subjects, in whom this disease, he says, chiefly occurs; from which impediments follow "distensions, spasms, and congestion in those vessels, and finally effusion." (*Hoffman*, op. citat. p. 214.) Cullen adopts Hoffmann's view of this disease: he considers it to be a *venous* hemorrhage, from obstructed circulation in the vena portæ and its branches; he thinks that its causes are of the same nature with those which give rise to the hemorrhoidal flux; but does not deny that in some cases there may be a true *atrabilis*, producing the symptoms of melæna. (First Lines.) Portal chiefly differs from Hoffmann and Cullen, in referring hematemesis and melæna to *arterial* hemorrhage from the stomach and intestines, occasioned by the afflux of blood by the arterial branches being greater than the corresponding veins can take up; maintaining that this is mostly owing to the compression of the trunk or branches of the vena portæ, occasioned by obstructions not merely of the spleen, as was formerly thought, but also of the liver, pancreas, mesentery, and other viscera of the abdomen. The opinions of Portal, modified by the doctrines of Bichat and his school, respecting arterial exhalation from mucous membranes, constitute the now generally adopted pathology of melæna and hematemesis. (See Hematemesis.) The dark colour of the blood, as has been observed by Portal, (and the observation is as old as Aretæus,) does not prove that the blood is derived from the veins, for the fluid and gaseous contents of the alimentary canal will act upon it after it is poured out, and deprive it of its bright colour. Perhaps this explanation of the intense blackness and pitchy appearance of the stools in melæna, is not quite satisfactory. Dr. Ayre has ingeniously contended, that as no trace of lesion is generally found in the mucous membrane on dissection, the hemorrhage which constitutes melæna and hematemesis does not take place from the capillary exhalants of the mucous membrane, but from the extreme minute ramifications of the vena portæ in the glandular texture of the liver. He argues that a certain degree of congestion of that important viscus will occasion an excessive and vitiated secretion of bile, constituting the common autumnal cholera, and the various modifications of bilious disorder; but that when this congestion occurs in a still greater degree, the extreme branches of the vena portæ are so distended that they cease to secrete bile, and pour out the dark and highly carbonized blood which oppresses them, unchanged; that this is taken up by the biliary pores and conveyed by the gall-ducts to the duodenum, whence it either regurgitates into the stomach, or is carried down the course of the intestines. Dr. Ayre conceives, therefore, that melæna and hematemesis scarcely differ, but in degree, as to the pathological condition which occasions their symptoms, from cholera and other bilious disorders; and he accordingly proposes the same treatment for both. (Ayre on Marasmus, 1st Edit. 1818.) These views are certainly ingenious, and, if established, would be highly important. But the arguments adduced by Dr. Ayre in his work are not conclusive; and his theory must still be considered as an hypothesis which may not impossibly afford the true explanation of *some* cases of hematemesis and melæna, where there is evidence of hepatic congestion existing in a great degree.

The pathology of melæna is still an obscure and very interesting object of inquiry. It is highly probable that in certain cases it depends not so much on mechanical obstruction and congestion

of the blood in the veins of the abdominal organs, as on a change in the physical and perhaps vital qualities of the blood itself, (*Andral*, Pathol. Anat.) which gives it a tendency to escape every where from its vessels. Such a state seems manifestly to exist in certain cases of purpura and of scurvy, in fevers of the typhoid type, and in some malignant varieties of small-pox, in all of which melæna, as an occasional symptom, occurs. Fully to develop this as yet mysterious condition of the blood, its dependence on the state of the nervous system, its connection with the nature of fevers and other diseases, is a problem of the greatest importance and difficulty in pathological science.

Though we have considered melæna as altogether a hemorrhagic disease, yet it may be proper to notice two cases in which the symptoms may closely resemble those of hemorrhage, yet not be truly such. The first is a discharge from the intestines of very dark and putrescent bile secreted in abundance from some irritation or congestion of the liver; the second, a truly *melanotic* discharge, proceeding (as supposed by Dr. Marcard in the case related by him,) from the breaking down of what he calls an atheromatous encysted tumour, in fact a mass of melanosis, either connected with the liver or alimentary canal, or else perhaps from a secretion of matter of the same kind from the mucous membrane of the stomach and intestines. The production of melanosis is not well understood. Does it consist of blood very little altered? Is the black matter vomited in cases of scirrhus pylorus for a considerable time before death, of the nature of melanosis?

Melanotic matter is distinguished from the sanguineous dejections of melæna by the absence of smell, and by the effect of dilution with water. The latter circumstance distinguishes it also from bile.

[A variety of melæna would seem to be produced by morbid secretion from the mucous follicles, (Copland, *Dict. of Pract. Med.*, art. Melæna;) and of this nature are, doubtless, the black discharges, which the writer has repeatedly seen, where the lining membrane of the intestines has been long irritated under the use of mercurial and other cathartics.]

Diagnosis.—Except the two cases just mentioned, and that of hematemesis, the discrimination of which from melæna (as they may jointly occur, and at any rate require similar treatment), is not practically important, melæna cannot require to be distinguished from any other affections, except hemorrhage arising from ulcerations, wounds, and injuries of the intestines, (which are not properly to be referred to melæna,) and the hemorrhoidal discharge. From the latter, where any necessity arises for discrimination, a better diagnosis cannot be laid down than that of Hoffmann, who says that melæna is to be distinguished by the tormina and spasmodic pain by which it is accompanied, and the imminent danger of death in which it places the patient, whereas the hemorrhoidal discharge is free from spasmodic pain of the bowels, and brings relief to any uneasiness which previously existed. Ulceration of the bowels is known by peculiar symptoms, which will be pointed out in treating of that affection.

Prognosis.—Melæna is almost always a symptom portending considerable danger. The only exceptions to this are where it occurs as a truly *critical* hemorrhage in fevers, or where it is attendant on hematemesis in young and plethoric females of unbroken constitution, and with vicarious or suppressed menstruation. The profuse discharge of blood, the debilitated state of the system in which it often occurs, and the organic diseases with which it is apt to be complicated, are the circumstances which constitute the danger by which its degree is to be estimated. The putrescent blood effused into the intestines and stagnating there, acting as a poison upon the nervous system, or re-absorbed into the circulating mass, was thought by Hoffmann to be the chief source of danger in this disease; and hence the great stress which he and others of the continental writers laid on clearing out the bowels by laxative clysters.

Treatment.—In the treatment of melæna, we have to deal with an intractable and too often an incurable disease, and almost always with an enfeebled and exhausted habit. Organic disease is always to be suspected in chronic cases, and where the disease occurs in advanced life, or in persons much exhausted by sedentary labour and anxiety, or weakened by intemperate habits, it is commonly a symptom of what is popularly but expressively termed "a breaking-up of the constitution." There is, therefore, little scope for active, much less for *heroic* remedies. Both during the hemorrhage and in the intervals, or after its cessation, the greatest quiet is to be enjoined; all disturbance of mind or body is to be sedulously avoided. The strength must be supported by the mildest nourishment, in such regulated quantities as not to disturb the stomach. The bowels must be kept open by the gentlest means, as castor-oil and mucilaginous clysters; nervous irritation is to be allayed by camphor and hyoscyamus. Opium and stimulating anti-spasmodics are to be avoided. Refreshing and antiseptic beverages, as lemonade, whey, &c. may be allowed in moderation; wine only where the debility is such as to require it, and where there is no febrile movement in the pulse; regard being also had to the constitution and previous habits of the patient.

Respecting astringents, we may refer to what has been said in the article on Hæmatemesis; observing only that they must in the case of melæna be employed with still greater caution. This applies especially to the more powerful remedies of this class. The mineral acids are useful rather as refrigerants and gentle tonics than as astringents. Where more of a styptic effect is required, the diluted sulphuric acid should be preferred; where a tonic or alterative effect is wished, the nitric. Dr. Mason Good recommends in preference the vegetable acids, and particularly the acetic. The remedy which has acquired the highest reputation as a styptic in melæna is the oil of turpentine. It appears to have been first recommended by Mr. Adair, in the fourth volume of "Medical Facts," &c. Dr. Brooke, of Dublin, and Dr. Cheyne, have since published cases illustrative of its employment, which have been already referred to, and Dr. Elliotson, in his published lectures, has borne testimony to its usefulness. Dr. Brooke gives three cases, in all of which the

hemorrhage was effectually and promptly arrested by the remedy when other treatment had failed. One of his patients died shortly afterwards, but the case was one of long standing, and probably connected with organic disease of the stomach; but this could not be ascertained, as inspection of the body was not allowed. The other two cases were doing well at the date of the paper, but only a short period had elapsed. It is evident that the oleum terebinthinæ, however successful in arresting the hemorrhage, has no influence on the primary cause of the disease, and therefore can be esteemed only a valuable palliative remedy. The formula employed by Dr. Brooke was the following:

℞ Olei terebinthinæ, guttas xxv.
Aquæ cinnamomi, f.℥i.
Syrupi aurantii, f.℥i.
M. fiat haustus ter die sumendus.

In Dr. Cheyne's case the result was less favourable, but the circumstances of it are not the less instructive, especially as it illustrates a caution given by Hoffmann, that astringents given in melæna are, in cachectic habits, likely to produce "a sudden transition to dropsy." A profuse melæna had continued two days. The patient, (a tailor, aged twenty-four, and of cachectic habit,) was growing weaker and weaker, when a "small dose" of ol. terebinth. was ordered to be taken every second hour. Dr. Cheyne does not state how many doses were taken; but it stopped the hemorrhage, but at the same time "seemed to lock up the bowels, so that for nearly three days he was without a stool, his abdomen all the while increasing in bulk. On the 16th, (the ol. terebinth. had been prescribed on the 11th,) there was evident fluctuation, and the stools, when at length obtained, consisted of hardened colourless fæces. First, crystals of tartar, then blue pill with squills, were given, which last affected his mouth in two days, and were discontinued. On the 28th, having taken a purgative, the hematemesis and melæna recurred; it continued two days, and the tension of the abdomen diminishing, he grew very weak and faint, and died on the 30th. The dissection is given at length, but need not be inserted here. Dr. Cheyne candidly owns that the treatment in this case was too energetic; that with more of *expectancy* the patient might have lived longer. This is an instructive point of the case: another important one is, the alternate morbid excess of action in the serous and the mucous exhalants — a fact often to be noticed in practice, and in the present instance affording a valuable caution against the too free use of astringents in certain hemorrhages.

When the hemorrhage is arrested without any such unfavourable concomitant events, we must endeavour to support the strength of the patient by moderate restoratives, according to the circumstances of the case, and do what we can to obviate the recurrence of hemorrhage by proper regimen, and medicinal treatment directed to the primary disease. This must necessarily vary according to the nature of the case, and it is unnecessary here to enter into the details of the various treatment which may be required in particular cases. The histories related by Portal may furnish some valuable hints if read with due discrimination, and allowance for national peculiarities of opinion and practice. His favourite remedies appear to have been leeches to the anus, and a course of very gentle alteratives, such as lime-water with infusion of camomile, of taraxacum, and other cichoraceæ, pills composed of soap and bitter extracts, clysters, tepid bathing; and in cases where a more tonic treatment was indicated, he prescribed the waters of Vichi, (a saline chalybeate highly impregnated with carbonic acid gas,) cinchona, and the moderate use of sound wine. In old and feeble persons especially, he found the best effects to result from the employment of the two last mentioned articles.

GEORGE GOLDIE.

MELANCHOLIA. See INSANITY.

MELANOSIS, from *μέλας*, *black*, and *νόσος*, *disease*. — Syn. Melanoma; [black cancer, black tubercle;] tumeurs mélaniques; dégénérescence noire; cancer noire; cancer mélané.

The term melanosis is employed to designate a morbid product, the distinctive character of which consists in a dark brown or black colour, of various degrees of intensity.

Although there can be no doubt that many of the ancient physicians were aware of the existence of the disease,—at least in some of its forms, which we are about to describe,—there is no such description of it in their writings as would lead us to believe that they regarded it either as a distinct disease, or in any other point of view than as one of the many local or general morbid states, which they supposed to originate in the predominance of one of the four elements—the *atrabilis* —of their humoral pathology.

The first account of this disease (the discovery of which is claimed by Dupuytren) was given by Laennec, in the Bulletins de la Faculté de Médecine de Paris, in 1806, and it was then named by him mélanose.

This distinguished pathologist describes melanosis as an accidental product, possessing a degree of consistence equal to that of the lymphatic glands, a deep black colour, a homogeneous tissue, somewhat humid, opaque, and presenting an appearance similar to that of the tissue of the bronchial glands of the adult. He says that it afterwards becomes soft, when there oozes out from it, on pressure, a yellowish red, thin fluid, mixed with small black particles, which are sometimes firm, at others friable, but still presenting a certain degree of flaccidity to the touch. At a more advanced period of this softening process, the particles, and soon afterwards the remainder of the mass of which they form a part, becomes quite friable, and is converted into a kind of liquid pulp.

The same author regards melanosis as occurring under the four following forms: viz., 1, that of masses enclosed in cysts (*Mélanoses enkystées*); 2, that of masses without cysts (*mélanoses non enkystées*); 3, that of infiltration in the tissue of organs; 4, that of deposition on the surface of organs.

A *liquid* form of melanosis (which is, in fact, the fourth kind of Laennec) has since been admitted by pathologists. Laennec not only knew of the existence of the disease under this form, but has even described it, although he has not given it a place among what he conceived to be

the essential forms of the disease. This circumstance, which some may consider as an oversight on the part of Laennec, is obviously to be referred to a fundamental error in the pathological doctrines which he maintained regarding the mode of formation, development, and termination of accidental or new products; for he believed that all these products possessed at first a greater or less degree of density, to which state he gave the name of *crudity;* and that they afterwards undergo at some period or other of their existence, by means of some change taking place within themselves, a process of solution, which he describes as the period or state of *softening*. The idea, therefore, of melanosis existing *primarily* in a *fluid* form was repugnant to such doctrines; consequently this form of the disease could not be admitted by him into the class of accidental tissues, to which he conceived melanosis to belong.

The division of melanosis, as to its forms, established by Laennec, has been adopted, with some slight modifications, by almost every author of note who has treated of this subject. The results of more recent researches, however, on melanosis and other morbid states and products which present the same distinctive physical character as the former, seem to us to suggest the necessity of a different arrangement of melanotic formations, and to warrant us in proposing one, which, we think, will comprehend all the forms and conditions under which these formations have been observed to occur.

Melanotic formations may take place in various and different parts of the body; may present considerable variety in the forms which they assume; and may owe their production to the operation of very different agents.

These circumstances do not appear to have been well understood, or their importance sufficiently appreciated, as Laennec has confined his description of melanosis to one kind only of black deposit; whilst Breschet,* Heusinger,† Noack,‡ Andral,§ and many others, have included under the same general denomination various and very different morbid states and products, because of their presenting, as their most remarkable character, a greater or less degree of blackness. To reject every black discoloration or product which does not agree in all its characters with those assigned to melanosis by Laennec, or to collect them indiscriminately into one entire group under the same appellation, as has been done by others, would obviously render the pathology of melanotic formations equally incomplete and inaccurate.

In order to conciliate these differences, and at the same time to facilitate the study of melanotic formations, we shall consider the latter as susceptible of being grouped under two heads, each presenting a certain number of forms, the distinctive or pathognomonic characters of which are derived from some peculiarity of seat, origin, or nature.

In accordance with this plan, we shall comprehend all anormal black substances, fluid or solid, found in the body, under the general title of *melanotic formations*. When these formations depend (as is the case with several of them) on some change taking place in the economy, or the important function of secretion, independently of at least the direct influence of any external cause; or, in other words, when they constitute what is called an idiopathic disease, we shall consider them as belonging to the first head, and as deserving the name of *true melanosis*.

Other melanotic formations have quite another origin, being the consequence of the accumulation of a black material introduced into the body from without; the action of chemical agents; and the stagnation of the blood. These we propose to include under the title of *spurious melanosis*.

We are perfectly aware that these terms are inaccurate, and that to avoid the ambiguity which the use of them may create, we might have arranged all black products or deposits under the general head of melanotic formations, distinguishing each kind in reference to some peculiarity in its external form, origin, or mode of production. By doing so, however, we should not have drawn a sufficiently marked line of separation between these anormal products, which, as we have already said, differ in their nature, and offer only one common external character by means of which they can be recognised by the practical pathologist.

The following tabular view will show at once the nature of the arrangement which we have adopted:

Classification of melanotic formations.

I. TRUE MELANOSIS.

Origin.	A modification of secretion.
Locality.	1. Tissues, systems, and organs. *a*, in the substance and on the surface of organs. *b*, in the cavities of hollow organs. 2. New formations.
Form.	1. Punctiform. 2. Tuberiform. 3. Stratiform. 4. Liquiform.
Seat.	1. Molecular structure of organs. 2. The blood.

II. SPURIOUS MELANOSIS.

Origin.	A. Introduction of carbonaceous matter. B. Action of chemical agents. C. Stagnation of the blood.
Locality.	Of first kind: the lungs. Of second kind: the digestive organs; the surface of serous and mucous membranes; the cavities of hollow organs; new formations. Of third kind: the blood.
Form.	Of first kind: uniform. Of second kind: 1. punctiform; 2. ramiform; 3. stratiform; 4 liquiform. Of third kind: punctiform and ramiform.

* Considérations sur une Altération Organique appelée dégénérescence noire, mélanose, &c., Paris, 1821; Journal de Phys. Exper. tom. i. i, No. 4.

† Untersuchungen über die anomahlie Kohlen; und Pigmentbildung. Eisenbach, 1823; Archives Gén. de Medecine, t. v.

‡ Précis d'Anatomie Pathologique, t. i.; Dictionnaire de Médecine, t. xviii. art. Mélanose.

§ Comment. de Melan. cum in Homin. tum in equis obveniente, &c. 4to., c. trib. tab. æn. Lips. 1826.

Seat. 1. The blood, contained in its proper vessels, or effused.
2. Pulmonary tissue: cellular and membranous.

From a very cursory view of the several circumstances included in the above arrangement, it will readily be perceived that melanotic formations must differ very materially from each other both in their composition and conformation.

I.—True Melanosis.

Locality of the Disease.—The cellular and adipose tissues are much more frequently found to present the true melanotic deposit than any other tissue of the body. Here, also, the quantity of the deposit is infinitely greater than in any other texture, and is always in proportion either to the quantity of this tissue, considered as a simple element, or as a component part of organs; or to the facility with which it admits, from its situation, of mechanical distension. Hence the reason why the largest masses of melanotic deposit have been found in the retro-peritoneal cellular and adipose tissues.

It is also of importance to know that melanosis may occur in either of these tissues separately. Marked examples of it, confined to the *cellular* tissue, are common in various parts of the body; and the most striking example of its circumscribed existence in *adipose* tissue is observed in the appendiculæ epiploicæ, or the fatty appendices of the colon, these bodies being sometimes converted into a homogeneous solid mass of melanotic matter.

Occurring, besides, as a primary affection of these tissues, the melanotic matter frequently extends to those situated in the immediate vicinity of the former, which it penetrates, or in which it forms excavations of various sizes, on account of the compression and subsequent absorption to which they have been subjected during the progressive development of this morbid product.

It is also by means of the cellular tissue that melanotic tumours spread to a great extent along the course of the blood-vessels and nerves, between the folds of the mesentery, and in the cavity of the pelvis, and where, on account of the size which they attain, they sometimes give rise to very serious consequences, to which we shall more particularly allude hereafter.

Mucous Membranes.—The melanotic deposit, notwithstanding what has been said to the contrary, has very rarely been observed in mucous tissue. We ourselves have only met with one example of it in this tissue, and it was even doubtful whether the deposit had its origin in the mucous or submucous tissue, both of them being simultaneously and contiguously affected.

Skin.—An opposite opinion has been entertained regarding the production of melanosis in this tissue, viz. that when found in the skin, it was to be regarded as the extension of that which existed at the same time in the subjacent cellular or adipose tissues. Such is frequently the source of melanosis of the skin; but we have found it to exist as a primary affection of this tissue, particularly in the horse. In this animal the melanotic matter may be seen occupying the very centre of the *cutis vera* in the form of black points, or varying from the size of a hemp-seed to that of a large pea, whether the subjacent textures contain any of the black deposit or not.

Muscular, arterial, and venous tissues; serous and synovial membranes; aponeurosis, tendon, and cartilage.—These have not, so far as we are aware, been found to contain any trace of the melanotic deposit as a primary disease. All of them may present the dark brown or black colour of melanosis, but this arises from contiguity, the imbibition or infiltration of the black matter when in a state of fluidity, or from other causes of a very opposite kind, to which we shall particularly direct the attention of the reader in a subsequent part of this article.

Bone.—The bones are not often affected with melanosis; the spongy bones, as the sternum, more frequently than others.

Liver.—Of all the *compound tissues* or organs the liver is by far the most frequently affected with melanosis: in this respect it is inferior only to the cellular and adipose tissues. The frequent occurrence of the disease, as well as the extent to which it proceeds in this organ, are no doubt in great measure to be attributed to the predominance of the cellulo-vascular element which enters into its composition. We shall, however, endeavour to show that the melanotic deposit is not confined to this element, but that it invades, as a primary formation, the molecular structure of this organ.

Lungs.—Notwithstanding the supposed frequency of melanosis in the lungs, it is by no means so often observed in this organ as in the liver; nor, perhaps, does it ever acquire the same extent as in the latter, although we are aware that cases have been recorded of the whole of both lungs being filled with it. This form of the disease will be considered under *spurious melanosis*, to which division of our subject we conceive it ought to be referred.

Brain.—Few cases of true melanosis of this organ are recorded by pathologists. We have only met with one case, the particulars of which will be related when we come to consider the physical and other characters of melanotic formations. Dr. Hooper (The Morbid Anatomy of the Human Brain, pl. xii. figs. 2 and 3) has represented a case of true melanosis of the brain.

Melanosis of the *kidney* has been occasionally met with. It is also found in the *testes* and *ovaries*; and Andral says that it occurs in the *uterus*. It has also been seen in the *breast*.

The *pancreas* and *lymphatic glands* in several parts of the body, and the *thyroid* and *parotid glands*, have presented the disease in various forms.

Melanosis of the *eye* has been frequently observed by surgeons, either alone, or combined with other morbid products.

Examples of melanosis occurring in the cavities of serous and mucous membranes are given by various authors; and Breschet, Cruveilhier, and Andral, have described it as existing within the veins. We have also had occasion to observe it in these cavities; but it is the spurious melanosis which has, in general, been observed in these situations, and has been described as examples of the true kind.

Blood.—The presence of true melanotic matter in the blood is an important fact, and one which,

under favourable circumstances, may be easily ascertained.

It has chiefly been in the minute veins of the liver that we have observed melanosis as a primary formation in the blood. The vessels which, in this organ, contain the melanotic matter, appear like black lines, striæ, or dots, and sometimes in a pencillated form, all of which appearances may be recognised as originating in the ultimate extremities of the veins of the liver, most probably the hepatic.

We are not disposed to believe that the black ramiform appearance so frequently seen in the lungs is owing to the presence of true melanotic matter in the extreme branches of the veins. Such may sometimes be the case, although we have not been able to satisfy ourselves that it really is so. The black colour of the contents of these vessels we rather attribute to the simple stagnation of the blood, and to the subsequent removal of *that*, the production of the red colour. A similar vascular arrangement of black matter has also been seen in the vessels of the stomach, and described as melanosis by several pathologists. But in this case error is conspicuous. The writer of this article has shown in another publication* that the black colour of the blood, not unfrequently seen in the vessels of the stomach, in the cavity of this organ, and in that of the intestines, is the result of a chemical process, and is always observed when the blood in these parts is either directly or indirectly brought in contact with the acid products which they contain: melanotic formations of this kind naturally take their place among those of spurious melanosis.

The existence of the matter of melanosis in the blood accounts satisfactorily for its being sometimes met with in the cavities of some secreting organs. It is also said to have been found in the saliva and bile, and likewise in the sweat and urine, in which last fluid a dark colouring matter was found by Dr. Marcet, which has received the name of *melanic acid*. The presence of melanotic matter in these secretions does not, however, appear to us to have been proved, except in the serous and mucous. It has, however, been observed in the medulla of bones, and in the humours of the eye.

Melanotic fluid may be found in cavities, either natural or accidental, without its being the product of their secretion. This happens when melanotic tumours perforate the walls of these cavities, and pour their fluid contents into them. This we have observed in the thorax and abdomen; and in one case a melanotic tumour had perforated the right lateral ventricle of the brain, in which was found a considerable quantity of black fluid, which afterwards passed into the third and fourth ventricles, and thence into the theca vertebralis. Such also is, in general, the source of the melanotic fluid found in accidental cavities.

The production of melanosis, scirrhus, carcinoma, and encephaloid formations in the same organ, and even in the same diseased mass, is occasionally met with.

The simultaneous existence of melanosis with these diseases, and the real or supposed analogy which the former presents in regard to its mode of development, progress, and termination, when compared with the latter, have induced some pathologists to consider melanosis as a species of cancer: how far this opinion is founded in truth, we shall not at present stop to inquire.

Such is, we believe, a correct, though general statement of the topography of melanosis. We shall now endeavour to describe the various forms which it assumes in the different tissues, systems, and organs of the body.

Of the Forms of True Melanosis.

1. *Punctiform Melanosis.*—Of the four forms under which we have included the true melanotic deposit, the first is that in which the black colouring matter appears in minute points or dots, grouped together in a small space, or scattered irregularly over a considerable extent of surface, and which we have termed *punctiform*. These appearances are most frequently met with in the liver. The cut surface of this organ appears as if it had been dusted over with soot or charcoal powder. When examined by the aid of a lens, the black points sometimes present a stellated or pencillated arrangement, which in some cases can be distinctly seen to originate in the ramiform expansion of a minute vein filled with black matter. At other times the melanotic matter appears to be deposited in the molecular structure of the organ in a manner similar to that of the organizable part of the blood. In such cases it consists of the most minute points disseminated throughout the acini or little lobules of the liver, and which then assume a uniform grey aspect. The various shades of grey and black which the liver presents when thus affected, depend on the greater or less quantity of the black punctiform injection; and we are inclined to believe that the melanotic tumour in this organ has, sometimes, a similar origin. We have always found the two forms, the punctiform and tuberiform, combined in the liver, lungs, and also the kidney. The "*infiltration des organes par la matière des mélanoses*" of Laennec is, in many instances, owing to the punctiform dissemination of the melanotic matter. In others it is obviously produced, as Laennec believed, by the simple diffusion of the liquid black matter throughout the tissues of an organ more or less remote from the part where it was formed. It is likewise to be attributed to general venous capillary congestion, or the effusion of blood, and the subsequent changes which this fluid undergoes, to be mentioned hereafter.

Punctiform melanosis is not observed in the brain, cellular, adipose, serous, and fibrous tissues It may take place in mucous membranes; but its occurrence must be rare, as we have already said that we have only seen one case of melanosis of this tissue, in which the submucous tissue was affected at the same time.

2. *Tuberiform Melanosis.*—This is by far the most common of all the forms of melanosis. The bulk of the melanotic tumour varies greatly, and, as we have already said, always acquires its maximum in loose cellular and adipose tissues: sometimes not larger than a pin's head, at others it equals in bulk the head of a child, or even that

* Recherches sur la Dissolution Chimique ou Digestion des parois de l'Estomac après la mort, &c. Journal Hebdomadaire de Médecine, 1830. No. 87, p. 351. No. 91, p. 517.

of an adult. It is, however, only in the horse that it acquires such an extraordinary size; in man it is seldom larger than an orange.

The great size of melanotic tumours depends on the agglomeration of smaller ones, the number of which varies with the size of the aggregated mass, or with that of the individual tumours of which it is composed.

The melanotic tumour, when single, is always of a spheroidal or ovoid form; and when aggregated, presents a lobulated appearance. In compound tissues or organs it is more frequently found single; in the cellular and adipose tissues, aggregated.

In both of these forms it has been described as encysted and non-encysted. It is said to be encysted when contained in a membranous capsule, and non-encysted when it lies in immediate contact with the tissue of the organ in which it is seated.

The encysted melanotic tumour does not, so far as our observation extends, occur, unless in a very imperfect state, in any of the compound tissues. It is chiefly found in the cellular and adipose tissues, a circumstance which the nature of the tissues sufficiently explains. The cyst of the tumour consists of cellular membrane—not of new formation—stretched out in the form of a thin transparent covering, from the gradual accumulation of the black melanotic matter contained within it. Hence melanotic tumours of the latter tissues are always provided with an external covering, which, as it not only adheres closely to them, but generally forms a constituent part of their internal arrangement, is separated from the loose surrounding cellular tissues when these tumours are removed, and which are therefore said to be contained in a cyst.

The tuberiform arrangement of the melanotic matter contained within a cyst is not confined to the cellular tissue as a simple element, or to those organs in which this tissue is more or less abundant. We have found it on the surface of the pleura and peritoneum in man, (Transactions of the Medico-Chirurgical Society of Edin. vol. i. p. 279, and Edin. Med. and Surg. Journal. vol. xxvii. p. 151,) and also in the horse. In this situation the melanotic tumours frequently assume a pedunculated appearance, being suspended by a slender neck, like some polypi, and are covered by a thin transparent serous membrane. Under such circumstances it is often difficult to determine whether the serous covering of these tumours is a new product, or merely an extension of pleura or peritoneum produced by the gradual accumulation of the melanotic matter in the cellular tissue beneath these membranes; and the difficulty of the case is increased if there exist at the same time, and in the same organ, tumours of a similar nature either in the sub-serous cellular tissue or in the parenchyma which it covers. Instances, however, have occurred which have afforded us the means of determining the seat of these extra-pleural and extra-peritoneal melanotic tumours. Thus we have seen these tumours co-existing with the more simple forms of the melanotic deposit, such as striæ or patches, consisting of a fluid or semi-concrete black matter lying on the free surface of the pleura or peritoneum, and enclosed in a fine, loose, spongy tissue, or serous covering of considerable tenacity, although almost equal in tenuity to a spider's web. The pleura and peritoneum beneath the melanotic deposit were perfectly entire, and therefore the solid material, whether cellular or serous tissue, in which it was enclosed, must be regarded as a new formation. The inference which we would draw from this is, that the melanotic tumour may, in some instances, have a similar origin, viz. in the deposition of melanotic matter on the surface of the serous membranes, and the subsequent or simultaneous formation of a tissue, which afterwards acquires the solidity and characters of a general serous envelope.

Melanotic tumours of the pleura pulmonalis and costalis are found either solitary or aggregated in considerable number, and vary in bulk from the size of a pea or less, to that of a cherry. When they are found in the peritoneum, it is generally where this membrane receives the name of epiploon.

4. *Stratiform Melanosis.* — This form of the melanotic deposit occurs only in serous surfaces: it presents two degrees or stages. In the first the black matter is so sparing in quantity that the serous membrane on which it is deposited presents an appearance as if it had been painted with ink or stained with a deep brown or black colour. In the second the black deposit is more copious, forms a distinct layer on the surface of the serous membrane, above which it is seen to project. The consistence of the matter thus deposited resembles, in general, that of firm jelly, and is enclosed, as we have already said when speaking of the preceding form of melanosis, either in a soft spongy tissue, or fine transparent serous membrane of new formation; so that, when pressed, it feels pulpy, but is not removed by a scalpel being passed over it, unless some force is employed.

This form of melanosis is described by Andral and others as occurring frequently on the peritoneum in chronic peritonitis. Such, however, is not the case. The "*melanoses déposées sous forme de couches solides à la surface des membranes*," described by this author, is of a diametrically opposite nature to that which we are now discussing under the appellation of the *stratiform*. It is the result of the chemical action of certain fluids and gases, formed in general in the digestive organs, on the blood contained in the vessels of the pseudo-membranes of the peritoneum, or effused into the substance of the one, or on the surface of the other, as we shall endeavour to demonstrate when we come to treat of this mode of production of melanotic formations.

The stratiform melanosis of serous membranes has not been observed to any extent in man. In the horse it is sometimes considerable in degree and extent, and is chiefly found on the peritoneum, pleuræ, and pericardium.

4. *Liquiform Melanosis.*—The appearance of melanosis in a liquid form has in general been confined to natural or accidental cavities into which it has been supposed to be poured by a process somewhat analogous to that of secretion. This is certainly one of the modes to which its presence in these situations is to be attributed; but it is also owing, as we have already remarked, to the effu-

sion of the same substance during the softening process of melanotic tumours; and it may also be observed that some of these tumours, when encysted, are found to be composed entirely of the black fluid or semi-fluid matter of melanosis. We shall, however, confine our description of the liquid form of melanosis as it occurs in natural or accidental cavities.

Among the former, the cavities of the pleura and peritoneum furnish almost the only examples in which liquid melanosis has been observed, and that, too, in very small quantity. We have never seen it in man, and rarely in the horse.

The mucous cavities, particularly in the stomach and intestines, are mentioned by several pathologists as furnishing, not unfrequently, examples of the presence of melanosis under this form. But in this instance, as in those to which we have already more than once alluded, in which other forms of melanosis are supposed to have their seat in the mucous tissue itself, the same mistake has been committed: the blood, either effused into these cavities or contained in the vessels of their proper tissue, and having been submitted to the influence of an external chemical agent, being in general the *material* thus improperly denominated.

As an example of accidental cavities in which fluid melanosis has been found, we may mention the serous cysts which form in the ovaries, and the capsules of the ova which have escaped from these bodies.

Whatever form the melanotic deposit may assume, it is never, so far as we know, confined to one tissue or organ only; on the contrary, it is found to pervade a greater or less number of these simultaneously or successively; being, in some cases, equally extensive every where; in others, small in quantity in one organ, while in another it is so abundant, that hardly any of the natural texture is to be perceived. The tuberiform deposit is the most conspicuous and prevalent of all the forms which this morbid product assumes.

General Characters of Melanosis.

1. *Physical Characters.*—These comprehend chiefly the colour, bulk, and consistence of the several forms of melanosis which we have described.

The *colour* of melanosis, whether in the solid or fluid state, although always tending to black, frequently presents various shades of brown, such as that of bistre or China ink, having either the dull aspect of soot, or the glossiness of pitch. The black colour and glossy aspect is more frequently met with in inferior animals than in man; and in both, these appearances are most marked when the melanotic deposit exists in the form of a firm tumour. It is hardly necessary to observe that the quantity of cellular tissue intermixed with the melanotic matter, as well as the presence of a certain quantity of blood, give rise to a greater variety in the shade and depth of colour than this substance would otherwise present.

The *bulk* which the melanotic deposit may acquire is sometimes very considerable even in the human species. It may form irregular or lobulated masses in the cellular tissue as large or larger than the fist; and in parenchymatous organs, such as the liver, it acquires the bulk of a hen's egg, or even that of a small orange. In the cellular tissue, the larger masses are almost always produced by the union of smaller ones, although in one instance we found in this situation a single tumour as large as a hen's egg. In the liver, single tumours of a large size are more common than in any other of the compound tissues, or even the cellular tissue, for the reasons which we have already stated. In the horse, the aggregated melanotic tumour has sometimes been found to weigh from twenty to thirty, and even forty pounds.

The *consistence* of melanosis, as we have already seen, presents great variety: there are two circumstances which seem to determine the degree of consistence which it is found to present when examined *in situ*: these are the *texture* and the *form* of the part in which the deposit takes place. Thus it is never found solid in large cavities, such as the abdominal and thoracic, for the plain reason that its diffusion is not limited by dense unyielding tissues. Even in tumours attached to the serous covering of these cavities, it is found for the same reason either perfectly fluid or not more dense than animal jelly. In loose cellular tissue, too, one, two, or a limited number of cells, more or less distended into the form of small tumours, are occasionally found to contain the black matter in a fluid state. In the dense texture of the cutis, on the contrary, even the smallest tumours may be nearly as hard as cartilage, and are generally as firm as the pancreas. In the lymphatic glands, and in the brain, the melanotic tumour acquires only a medium degree of consistence, although it is generally firmer in the former than in the latter, on account of the capsule of the glands acting as a compressing cause. In the liver and lungs we perceive the same relation between the structure of these organs and the consistence of the melanotic tumours formed in them. In both they are pretty firm; much about the consistence of a lymphatic gland; from the black matter being contained either in the capillaries, molecular structure, or cellular texture of these organs.

It is an important fact that the conditions of texture and form, or the composition and conformation of the tissue or organ in which the melanotic deposit takes place, determine almost exclusively the degree of consistence which this morbid product, and indeed every other, presents when examined *in situ*. That absorption and imbibition exercise a certain influence in modifying, under certain circumstances, the consistence of this matter, cannot be doubted, inasmuch as they are known to give rise to very marked changes in the consistence of some other morbid products. We have, however, already shown that the operation of either of these modifying causes, as regards the consistence of melanosis, must be very limited, since there is always a direct relation between the consistence of this morbid product and the conditions of the tissues which we have named, in which it is received and retained. It is indeed from a knowledge of this pathological fact that we are led to believe that the *primary* condition of melanosis is that of a fluid, formed or collected in the capillaries and minute cellular areolæ, or combined with the solid or fluid elements of the body. If this fact is not admitted to be demonstrated by the evidence which we have adduced, we should then be compelled to adopt,

at least in part, the opinion of Laennec, namely, that melanosis is, *ab origine*, a solid accidental product: as to its being a *tissue*, as it was believed or said to be by the same author, we shall inquire by-and-by, when speaking of its anatomical characters. And to show that this mode of origin is not peculiar to melanosis, we may mention that tubercle, cancer, and every other morbid product can be traced to this their primary and fluid state of formation. In this respect, therefore, there is no difference between morbid and natural products. The law is the same in both: the hardest texture, in the latter, namely, bone, being in its primitive state a mere jelly, as scirrhous and accidental bony formations are in the former. Even calculi do not form an exception to this law, the bile, urine, and other fluids, in a morbid state, constituting the primary forms of these bodies, before their respective elements become tangible to our senses by means of chemical agency; and as the last link in this chain of analogy, the blood—the *fons et origo vitæ*—may be regarded as the representative of the primary condition of organization in general.

Like all colouring matters in a fluid state, that of melanosis, when placed in contact with a white surface, communicates to it its peculiar tint, but the stain thus produced is readily removed by ablution. In its natural state, or when mixed with water, exposed to the air it becomes dry, brittle, and pulverizable, and does not emit the odour of putrefaction until after a long period. When burnt, it swells, gives out a great deal of smoke, a marked empyreumatic odour, and is converted into a carbonaceous substance. It is quite opaque, and has no marked odour or taste.

2. *Anatomical Characters of Melanosis.*—Several of the anatomical characters of melanosis have already been enumerated in the description which we have given in the different forms of this disease. When speaking of what is called the *encysted* melanosis, we explained the reason why this appellation had been employed, namely, that the single or aggregated masses of melanotic matter found in the cellular tissue are enclosed in and united together by a capsule of the same tissue stretched out by the gradual accumulation of this matter. This membranous covering (for it is not a cyst) is generally so thin and transparent, that the black colour of the melanotic matter is hardly if at all obscured by it. If the tumour be simple, and a quantity of the black deposit has been washed out of it, a multitude of fine filaments and lamellæ are seen connected with the membranous covering of the tumour, traversing the substance of the latter in every direction, and presenting an appearance resembling cellular tissue when distended with serosity. When a number of tumours are united into one mass, they are included in a common capsule, and separated from one another by their respective coverings and portions of cellular tissue contained in the angular spaces sometimes left between them.

It is in these filamentous and cellular tissues alone, which are obviously not of new formation, that blood-vessels or nerves are to be seen. Minute arteries and veins can be seen ramifying in both, although they are rarely numerous, and we have never seen them pass beyond the limits of these tissues. Large branches and even trunks of arteries, veins, and nerves are sometimes found passing over the surface, or included in the aggregated masses of melanotic tumours.

There is a considerable difference as to the relative quantity of cellular tissue and melanotic deposit which constitute these tumours, when examined in man and in inferior animals. We have never found the melanotic tumour in the horse to contain much cellular tissue: indeed, it is sometimes impossible to detect its presence until after the tumour has been macerated and the black matter squeezed out, when there is found to remain a small quantity of extremely fine, soft, cellular tissue. In man, on the contrary, we have seen it at least equal in quantity to the black matter in tumours nearly as large as a goose's egg formed in the subcutaneous cellular tissue. An example of this kind of melanotic tumour, which we had an opportunity of examining in the recent state, is now preserved in the museum of the Royal College of Surgeons in Edinburgh, and a drawing of it is in the possession of Dr. Thomson, the distinguished Professor of Pathology in the university of that city. The cellular tissue was remarkably conspicuous, in some points almost as dense as fibrous tissue, formed bundles which intersected one another in various directions, and thus formed irregular cells of various dimensions, in which the melanotic deposit, of the consistence of fluid pitch, but without tenacity, was contained.

We have stated that the blood-vessels are confined in their distribution to the cellular tissue, which enters into the composition of melanotic tumours, and that they are never seen to penetrate the black deposit. There is, however, one kind of tumour, already alluded to, which is almost entirely formed of blood-vessels and a black or deep brown fluid. We formerly expressed a doubt whether this tumour should be regarded as one of the true melanotic kind, by reason of its anatomical composition being an exception to that observed in all others. This kind of tumour we have only met with once, and so far as we know there is only one other example of a similar kind on record. The subject of our case was an old man, between seventy and eighty years of age, brought to the Hôtel Dieu of Paris in a state of incomplete paralysis, and incapable of giving any account of himself. He lived several days; had little or no fever or excitement of any kind. The paralysis soon became complete and general, and he died in a state of collapse and profound stupor. On examining the body after death, black or deep brown coloured tumours, two of which were as large as a hen's egg, occupied both hemispheres of the brain. One of them had made its way through the walls of the right lateral ventricle, poured a quantity of the black fluid with which it was impregnated into this cavity, which had passed from thence into the opposite ventricle, the third and fourth, and along the spinal cord to its inferior extremity. Although these tumours were almost entirely surrounded by the medullary substance, they must have been seated originally on the external surface of the brain between the convolutions; for they were intimately connected with the pia mater, the blood-vessels of which constituted by far the greater part of their bulk

The blood-vessels were crowded together in parallel bundles at their exit from the pia mater, became tortuous in the substance of the tumours, some of them having nearly a line in diameter; were reflected backwards at their extremities in the form of irregular interlaced groups, towards which two or three small arteries coming from the pia mater were seen to distribute themselves. The black colouring matter of these tumours was very abundant, nearly as fluid as ink, and was contained not only in the loose cellular tissue which separated the blood-vessels from one another, but likewise in the vessels themselves. The veins (or large tortuous vessels described above) were completely filled with it, whilst the arteries, minute as they were, were distinctly seen to carry red blood. The medullary substance was slightly reddened and somewhat soft where it was in contact with one of the large tumours only. The cortical substance of the convolutions contained three or four melanotic tumours rather larger than hemp-seed. They were quite unconnected with the pia mater, were not composed of blood-vessels like the others, presented the usual consistence of melanosis, and contained but a minute quantity of cellular tissue.

Besides these black tumours — vascular and non-vascular — there was one of another kind, about the size of a small cherry, situated in the brown substance of the corpus striatum of the right hemisphere. Instead of being black, it was of a reddish grey colour, and was traversed by a great many minute vessels filled with red blood. It was nearly of the same consistence as the others, but, when pressed, discharged a small quantity of a milky or creamy looking fluid. After having been submitted for some time to ablution and gentle pressure, it assumed an appearance somewhat similar to that observed in the black vascular tumours: its tissue was of a spongy reticulated character, of a dull red colour, and vascular. There was no tumour of a similar kind in any other organ of the body; but as it participated in the characters of erectile and carcinomatous formations, we may mention at present that there existed a somewhat analogous disease of the right parotid gland. This body formed a large oblong tumour, composed of a substance partly of a scirrhous and partly of a mammary aspect and consistence, grouped into irregular masses of various sizes, surrounded by a considerable degree of ecchymosis. At its upper extremity and on a level with the ear there was a melanotic tumour of a firm consistence and homogeneous aspect, as large as a Spanish nut. This tumour had perforated the external auditory canal, and projected into its interior.

Black tumours, similar to those of the brain, were also found in the abdominal viscera. The duodenum contained one, the ileum five, and the epiploon one. In the intestines they appeared to be seated in the submucous cellular tissue, and formed the bottoms of black ragged ulcers occupying the mucous membrane. They were of a round or oval shape, flat, the largest of them about an inch in diameter. The one found in the epiploon was nearly as large as a walnut. It was attached to one of the prolongations of this covering, between which and the tumour there existed the same kind of vascular connection as between the pia mater and some of the tumours in the brain: it presented likewise the same internal structure as the latter. Those which were found in the submucous cellular tissue did not present any peculiarity of structure.

The above description contains the most of the anatomical facts of any importance connected with this interesting case, which occurred under the care of Dr. Menière, while *interne* in the Hôtel Dieu, and to whom we feel much indebted for the opportunity he afforded us of examining and delineating the appearances we have described. When shown to Baron Dupuytren, he pronounced the case to be one of melanosis; or, in his own language, *cancer noire;* his opinion being obviously founded on the *colour* of the tumours, without any regard to their *structure.*

Dr. Menière, on the contrary, who has had extensive opportunities of examining diseased structures, considered it to be a case of fungus hæmatodes, the vascular organization of the tumours constituting, according to him, the essential character of the disease; whilst the black colour was merely an accidental circumstance of very inferior importance. We ourselves are of opinion that neither of these notions is borne out by the anatomical facts of the case as above related; and had we not already extended this part of our article beyond the limits usually assigned to descriptive details in a work of a practical nature, we should have furnished collateral evidence sufficient to show that both opinions are exclusive, incomplete, and inaccurate. We shall, therefore, only make a few remarks, with a view to our being justified in placing for the present this case in the division of *true melanosis.* And first, we have two or three melanotic tumours of the ordinary kind in the cortical substance of the brain; one in the parotid, or in a carcinomatous tumour found in that gland; to which we may add those of the intestines; we have here, therefore, as far as regards these tumours, a case of true melanosis. Secondly, there existed a large tumour behind the ear and in the parotid, presenting the most marked characters of scirrhus and cancer. Here, then, we have a case of cancer, but not of fungus hæmatodes. Thirdly, we have the black vascular tumours of the brain. The question is—did they present the anatomical characters of scirrhus, cancer, or fungus hæmatodes? Certainly not. They were no doubt vascular, but must not on that account be identified with carcinoma or fungus hæmatodes, for the essential character of both of these was wanting, viz. a fluid resembling milk or cream, or a substance of the colour and consistence of brain; and, besides, carcinoma and fungus hæmatodes do not necessarily possess a high degree of vascular organization.

The production of the black vascular tumours of the brain may be accounted for as follows. The original state of these tumours we believe to have been the same as that of the small tumour situated in the corpus striatum, and which, we said, was of a compound nature, from its structure resembling that of erectile tumours, and the fluid it contained being similar to that which is found in carcinomatous tissue. The melanotic

fluid, which we found deposited in the usual way, that is to say, in the form of small, dense, homogeneous tumours, in several points of the brain and elsewhere, appears also to have been deposited in these erecto-carcinomatous tumours, after they had acquired considerable bulk. Thus the black fluid which they contained, (which we have no reason for believing differed in any respect from that contained in those that were not vascular,) instead of being deposited in the form of a homogeneous mass, assumed the form and arrangement of the anatomical elements of these tumours, that is to say, was collected in the veins and cellular tissue of which they were composed. From these remarks on the origin and mode of production of the black vascular tumours of the brain, we do not hesitate to say that, in the strict sense of the term, they do not merit the appellation of true melanotic tumours, but that they ought to be considered as examples of melanosis taking place in a tissue of new formation, just as it is found to do in other tissues, whether healthy or diseased.

The other case of vascular melanosis to which we alluded is mentioned by Lobstein. (Traité d'Anatomie Pathologique, tome premier, p. 461.) The patient was an emaciated old woman, between eighty-five and ninety years of age. The inspection of the body was made by M. Alex. Lauth, and also delineations of the melanotic tumours. Besides melanosis of the spongy substance of the inferior third of the femur, there were several black tumours on the anterior region of the neck, and a large one in the inferior lobe of the right lung. The former appeared to be encysted; they were of a round form, and lobulated; the most of them movable under the skin, and were formed of a plexus of veins coming from the neighbouring veins, which became dilated as they approached the tumours. All these vessels, not only those which penetrated, but also those which formed the tumours, were filled with a deep brown substance, having, from the presence of an irregular filamentous tissue, an appearance of organization. In some of the veins, the substance which filled them adhered firmly to their internal surface, and seemed continuous with their tissue, although the latter differed from the former, from its being firmer and of a whitish colour.

The matter contained in the tumour in the lung was fluid, and as black as ink; it was infiltrated into the pulmonary parenchyma, which was reduced to a filamentous tissue. However, when minutely examined, this tissue was found to be composed of arteries and veins, swimming in the melanotic fluid, and containing a quantity of it in their interior.

Although the author of this observation does not speak of any other morbid product having been found in the body, except a small horny excrescence on the left side of the thorax, we feel satisfied that the vascular tumours which he has described were precisely of the same kind as those of which we have just given a description. The most important circumstance in both cases was the presence of the melanotic matter within the blood-vessels of the tumours. In Lobstein's case, it appears to have been contained in the arteries as well as veins, whilst in ours it was observed only in the latter. In either case, the presence of melanosis in the blood is clearly demonstrated. Venous absorption might be considered by some sufficient to explain its presence in the veins; but it was also found in the arteries; and besides, we have already shown that its existence in the veins of the hepatic tissue is prior to, and independent of, its presence in the cellular tissue, or its combination with the molecular structure of this organ.

3. *Chemical Composition.*—The melanotic deposit in the fluid and solid state has been submitted to very minute chemical analysis in this country and on the continent; the uniform result of which shows that melanosis bears a strong analogy in its composition to that of the blood. The most complete analyses of melanosis that have been published, are those of Lassaigne and Barruel,* in France, and of Dr. Henry, of Manchester. (A case of melanosis, &c., by Thos Fawdington.) We shall not enter into the details of the analysis of the melanotic deposit furnished by each of these able chemists, but shall content ourselves by giving the facts thus elicited, which seem to prove that the composition of this morbid product is very similar to that of the blood; referring the reader for further information to the works mentioned below.

Mons. Lassaigne found the melanotic tumour of the horse composed of — 1st. coloured fibrine; 2d. a black colouring matter soluble in weak sulphuric acid, and in a solution of the subcarbonate of soda, each of which becoming at the same time of a red colour; 3d. a small quantity of albumen; 4th. muriate of soda, subcarbonate of soda, phosphate of lime, and oxide of iron. According to Mons. Barruel, melanosis of the human subject is essentially composed of the colouring matter of the blood, united with fibrine, both of them "*se trouvant dans un état particulier*," and three distinct kinds of fatty matter. The first of these is soluble in alcohol at a moderate temperature, crystallizable; the second soluble in alcohol at a boiling heat only, soft, and not crystallizable; the third fluid at the ordinary temperature of the air, and of a reddish-brown colour. This chemist found also a considerable quantity of the phosphate of lime and iron.

The following is the result of the analysis obtained by Dr. Henry from a portion of a softened melanotic tumour taken from Mr. Fawdington's patient, and after it had been kept some time in spirit:—

1st. By filtering through paper, much of the colouring matter remained on the paper, and the colour of that which passed through was much less intense.

2d. Boiling does not destroy the colour, nor even when a little caustic potash has been added.

3d. It is not changed by acids even when heated, except by nitric acid, which deprives it of its black colour, and turns it yellow.

4th. A stream of chlorine passed through the liquid destroys the colour, and throws down light fawn-coloured flocculi.

5th. A few grains of corrosive sublimate stirred

* Considérations sur une altération organique appelée dégénérescence noire, &c. Par G. Breschet, Chef des travaux anatomiques à la Faculté de Médecine de Paris, &c. &c.

up with the fluid precipitates the whole of the colouring matter, and leaves the supernatant liquid quite clear.

6th and 7th. Nitrate of mercury and muriate of tin produce the same effect, but more slowly. We may also mention that M. Foy (Archives de Médecine, Juin 1828) found in the melanotic tumour of the horse,

Albumen	15,00
Fibrine	6,25
A highly carbonized principle, probably altered cruor	31,40
Water	18,75
Oxide of iron	1,75
Sub-phosphate of lime	8,75
Muriate of potash	5,00
Ditto soda	3,75
Carbonate of soda	2,50
Ditto lime	3,75
Ditto magnesia	1,75
Tartrate of potash	1,75

From the results of all these analyses it is sufficiently obvious that melanosis is essentially composed of the constituent elements of the blood. The colouring material of its composition appears, also, to bear considerable analogy to that of the blood, and is, according to Foy, a highly carbonized principle. Andral puts it as a query, whether the fatty substances found by Barruel belonged to the melanotic tumours analyzed by this chemist, or to the tissues of the organ in which the tumours were formed? That these fatty substances may have become incorporated with the melanotic matter during its deposition is possible; but it must also be admitted that they may have been deposited along with it as constituents of the blood, inasmuch as it has been shown by Lecanu (An. de Chim. et Phar. xlviii. 308) and by Dr. B. Babington, that this fluid always contains in the healthy state a certain quantity of fatty crystalline and oily matter.

Seat, Nature, and Origin of Melanosis.—We must refer the reader to the preceding section for proofs that the material of which melanosis is composed is formed in the blood, and afterwards deposited in the various parts in which it is found. It is not only because this material is seen in the blood that we have fixed its *seat* in this fluid, but because our anatomical researches show that it is there formed. The chemical analysis which we have given of this substance confirms the accuracy of this opinion, by showing that it is essentially composed of the colouring matter of the blood. The separation of this colouring matter, as well as its disposition, in the form of melanosis, must be regarded as the result of a process similar to that of secretion. [M. Al. Cazenave (*Dict. de Méd.* 2de édit. xix. 343, Paris 1839) with MM. Breschet and Barruel, considers it, indeed, both from chemical analysis and an examination of facts, to be nothing more than modified extravasated blood.] Several pathologists in France and Germany regard the carbonaceous matcrial of melanosis as having its origin in a modification of the secretion of the natural pigments of the body, and more especially of that on which the colour of the hair and skin depends. This opinion was first entertained by Gohier, (Mémoires et Observations sur la Chirurgie et la Méd. Vétérinaire, Lyon, 1813, tom. i.,) who states that melanosis probably depends on the increase or diminution of some of the elements which enter into the composition of the body of the white and grey horse or in some remarkable change in the nature of the secreted fluids. The carbon, says this author, which is found in melanosis, is too easily separated by calcination, to permit us to ascribe the colou. of this disease to any other substance. Breschet afterwards pointed out the analogy which exists betwcen the black matter of melanosis and that which colours the choroid, the uvea, the rete mucosum of Malpighi in the negro, and the placenta of certain carnivorous animals. He regarded, also, the colouring matter of several morbid secretions as of a similar nature, such as melæna, the black coating of the tongue in fevers, the fluids rejected by vomiting in yellow fever, &c.—an opinion which we consider to be by no means correct. A similar opinion is, however, entertained by Heusinger in his researches on the accidental production of pigments and carbon in the human body. The following are the deductions which this author gives as the result of his investigations:—1. that all the pigments secreted in the body in the healthy state are rich in carbon: 2. that the accidental pigments resemble the natural; 3. that the anomalous pigments are a modification of the colouring matter of the blood; 4. that their secretion is intimately connected with that of the fat; 5. that they announce the predominance of the venous system, the want of oxidation, and particularly the decarbonization of the blood. Some of these deductions, viz. that the secretion of the colouring matter of melanosis is intimately connected with that of the fat and the predominance of the venous system, do not appear to us to be supported either by the evidence brought forward by the author, or by such facts as have fallen under our own observation; for in the many cases of melanosis which we have seen in man and various kinds of animals, there did not appear to be any visible connection between this disease, either with regard to its locality, degree, and extent, and the secretion of fat, or any state of the venous system in particular. The much greater frequency of melanosis in the grey and white, than in the bay, brown, or black horse, is a circumstance of some importance, and which may be regarded as favourable to the theory which ascribes the origin of melanosis to the accumulation in the blood of the carbon which is naturally employed to colour different parts of the body, and more particularly the hair. This theory we are disposed to adopt, not only as regards the formation of the disease under these circumstances of colour, but also when it occurs in animals of a dark colour, and in man indiscriminately, whatever may be the peculiar tint of the skin or colour of the hair. In the first instance, the colouring matter formed is not deposited in the regular physiological order; in the second it is formed in too great quantity. In both cases its presence and accumulation in the blood are accounted for. Its deposition as an anomalous product in various parts of the body follows, as we have already said, as a consequence of its separation from that fluid by a process of secretion.

Causes.—The above remarks antioipate the

necessity of any further notice on what is called the *proximate causes* of melanosis. With regard to the *remote causes* of this disease, particularly the influence of external agents, it does not appear to us that our knowledge amounts to any thing more than conjecture. We know that the development of colour in general is favoured by exposure to light, heat, and that combination of physical agents which constitutes the climate of warm countries; and that it is retarded by obscurity, cold, imperfect sources of nutrition, &c. None of these facts, however, seem capable of affording us any explanation respecting the remote origin of melanosis, still less of its affecting one kind of animal rather than another. We should have observed before, that melanosis occurs most frequently towards the decline of life.

Progress of Melanosis.—Under this head, it is our intention to describe, 1st, The changes which take place in the melanotic deposit itself; 2d, The changes induced by this deposit in the tissues and organs in which it is contained, or with which it is more or less immediately connected.

1st, *Changes produced in the melanotic deposit.*—Only two changes are observed to take place in the melanotic matter after its deposition. The first consists in the inspissation or solidification, the second in the softening or liquefaction, of the melanotic matter. What we have already said on the various forms, the physical and anatomical characters of melanosis, will in a great measure enable the reader to trace these changes to their respective causes, and to explain the manner in which they are produced. We have, we hope, satisfactorily shown that the material of which melanosis is composed exists primarily in a fluid form, and that every increase of consistence which it afterwards acquires, is owing chiefly either to its combination with the molecular structure, or the dense unyielding nature of the tissues or organs in which it is deposited. In the first instance, (examples of which were pointed out in the liver,) its consistence becomes considerable; in the second, it acquires its maximum of density, of which its development in the cutis vera furnished us with the most striking examples. When retained in the vessels in which it is formed, it either remains in its primitive state of fluidity, (see our case of melanosis of the brain,) or it acquires a certain degree of consistence, (Lobstein's case of melanosis of the neck, &c. l. c.) We also found that when it is effused on the surface of the serous membrane, the degree of consistence which it afterwards acquires depends entirely on the development of an accidental serous or cellular tissue within which it is included. Its various degrees of consistence in cavities, viz. those formed in the cellular tissue by its gradual accumulation, are referable to the same causes; the mechanical resistance offered to its diffusion by the tissues and organs we have named. These facts regarding the manner in which the solidification of the melanotic matter is effected, as well as the causes to which it is to be referred, appear to us so conclusive, that it would serve no good purpose were we to call in the evidence of analogy furnished us by the mode of development of other products of a similar and dissimilar kind, as farther proof of the accuracy of the opinion which we have just expressed.

From these facts it follows as a consequence, that the process of softening cannot take place until that of solidification has been at least carried to a certain extent: perhaps it never does take place until it has been carried to its maximum. For the softening of the melanotic deposit is observed only when it has acquired the form of a tumour, or occupies an irregular portion of an organ. Under these circumstances, the softening of the hardened melanotic mass is effected in the two following ways: first, by the destruction of the tissues included within it and around it; second, by the effusion of serosity caused by its stimulating power as a foreign body. The liver and lungs furnish the best examples of softening of melanotic tumours, from the destruction of the tissues in which they are formed. When a portion of either of these organs is occupied by the melanotic deposit which has so accumulated as to compress or obliterate the vessels contained within it, that pass through it, or ramify in its immediate vicinity, congestion or death of the parts to which these vessels are distributed, follows as a necessary consequence. Besides this cause of effusion, (congestion,) the stimulus of the melanotic tumour is now more particularly felt, and the serous part of the blood is poured out in abundance, which, mixing with the melanotic matter, converts it into a soft pulp, or a thin dark-brown or black liquid.

It were needless to insist farther on these changes, or to combat the opinion which Laennec entertained in regard to the manner in which he imagined the last process was accomplished: that melanosis is not a tissue, but an unorganizable fluid, capable only of a certain degree of solidification, must appear obvious to every impartial pathologist who has had an opportunity of observing it in the different tissues and organs in which it is deposited, and under the various forms which it assumes.

2. *Changes induced by the melanotic deposit in the tissues and organs in which it is contained, or with which it is more or less immediately connected.*—These changes are few in number, viz. *irritation, compression*, and *ulceration.*

We have just alluded to irritation as a consequence of the presence of masses of the melanotic deposit, and the subsequent afflux of blood to the surrounding parts. It is seldom carried to the extent of inflammation and ulceration; and when either of these occurs, it is almost always confined to the tissues in immediate contact with the melanotic masses.

Compression, we have also said, may be carried to such a degree by the gradual accumulation of the melanotic deposit, that circulation ceases in the cellular tissue in which this deposit is contained. The same thing also occurs in the cellular covering of melanotic tumours, and more particularly in the skin and mucous membrane of the intestines, when, from the bulk of the tumours, these tissues become more or less stretched. Hollow organs, such as veins, the rectum, and colon, are occasionally much compressed, nearly or entirely obliterated. These effects, however, are only observed when the melanotic tumours have acquired a great bulk, and are, therefore, much

more frequently met with in the horse than in man.

Ulceration is not common as a consequence of melanosis, and in the cases in which we have observed it, it was obviously to be referred to the combined operation of the two causes mentioned above; compression, perhaps, having a greater share in its production than irritation. Thus we have only observed it in the skin and mucous membrane when greatly stretched by melanotic tumours situated beneath them. We have a very good example of ulceration of the mucous membrane of the intestines in our case of melanosis of the brain, &c.; and Breschet gives a case of ulceration of the skin of the groin produced by a large melanotic tumour situated immediately beneath it. (Loc. cit. p. 10.) Ulceration of the skin, notwithstanding its great thickness, is more frequently seen in the horse. The writer of this article has related a case in which the ulceration was accompanied with suppuration, and which may be regarded as an example of ulceration from irritation rather than from compression and subsequent obliteration of the capillaries. (Transactions of the Medico-Chirurgical Society of Edinburgh, vol. i. p. 267.) With regard to the melanotic ulcer, its form is sometimes regular, at other times very irregular; its edges thin, soft, beveled from within outwards, pale, or more or less red, or tinged with black, and a black fluid oozes from its surface. But if chronic inflammation supervenes in the tissues surrounding it, these tissues acquire a considerable degree of thickness from their being infiltrated with serosity and coagulable lymph. They thus become hard, and project around the orifice of the ulcer in the form of a broad everted border, or form on its internal surface a number of irregular projections or excrescences. When cut through, a grating sound is produced, and the cut surface presents a pale grey colour, such as is observed in scirrhus.

Ulceration from melanosis of other tissues and organs of the body has very rarely been met with. Bayle relates two cases of what he conceives to be ulceration of the lungs as a consequence of the softening of melanosis, (Recherches sur la Phthisie Pulmonaire, obs. xx. and xxi.) and which are considered in the same point of view by Laennec. (Traité d'auscult. médiate, &c. tom. ii. p. 31.) But we agree with Andral in thinking that they were cases of tubercular excavations or dilatations of the bronchi, the pulmonary tissue around them being the seat of chronic inflammation, and infiltrated with what is called black pulmonary matter.

Symptoms and Diagnosis of Melanosis. - Among the various modifications of function to which melanosis gives rise, we do not believe that the most careful examination will enable the physician to perceive in any one of them a sign of the existence of this disease in internal organs. It is only when melanosis makes its appearance externally, that he can hazard an opinion that any derangement of function is owing to its presence in one or more internal organs; that oppression and difficulty of the respiration are produced by a similar disease of the lungs, when, by means of auscultation and percussion, he finds that certain portions of the lungs are impervious to the air, without having become so by any other disease with the characters of which he is acquainted; and that ascites and œdema of the inferior extremities are in all probability the consequence of compression of the portal system of the liver, from the presence of melanotic tumour in that organ. The presence of black sputa in the first case may, under certain circumstances, afford him some assistance in establishing his diagnosis; as its quantity, and its appearance at the time that one or more of the supposed tumours in the lung have been observed to soften.

Vomiting and dejections of black matter do not afford any evidence of the existence of melanosis either in the stomach or intestines, or any other organ. The same may be said of the state of the pulse, temperature, and nutrition in general. In some cases the pulse and temperature have assumed a febrile character, and the patients become lean, pale, or sallow; changes which may be attributed to the mere mechanical presence of a great quantity of the melanotic deposit in important organs, thus operating on the one hand as a morbid stimulus, and on the other preventing the blood from undergoing various important changes. Melanosis does not appear to give rise to pain except where nerves have been impacted within, or compressed by it in some unyielding cavity. It is for this reason that the eye is generally the seat of pain in melanosis.

Prognosis. — Under whatever circumstances this disease may present itself, it ultimately proceeds to a fatal termination. It is sometimes developed with considerable rapidity, and when it occupies important organs, such as the brain or lungs, the life of the patient is seldom prolonged beyond a few weeks or months. The fatal effects of the disease are also retarded or accelerated by its extent; being greatly accelerated if it occupies the greater part or the whole of an organ, or a great number of organs at the same time, which is frequently the case, and retarded if limited to one organ or tissue. But we must again repeat that, however favourable the circumstances may be under which it first announces its existence, its tendency is to increase and ultimately to prove fatal.

Treatment.—From what we have said of this disease, it is but too obvious that any mode of treatment that can be adopted must be only palliative in its effects. To have pointed out, so minutely as we have done, the physical, anatomical, and chemical characters of melanosis, in order to show that it originates in a modification of secretion of a carbonaceous pigment analogous to the colouring matter of the blood, may, therefore, appear to the reader to be a waste of labour and of time; but we must remind him that there are a host of diseases the treatment of which is founded on no surer grounds, and respecting the history of which we know much less than we do of that of melanosis. In this respect, therefore, the scientific practitioner will at least have the advantage of being able to give a satisfactory reason for the mode of practice which he may think proper to adopt in the treatment of this very remarkable disease.

II.—Spurious Melanosis.

A. *From the introduction of carbonaceous*

matter.—Although certain forms of black discoloration of the pulmonary tissue were supposed by Laennec to originate in the inhalation of the carbonaceous product of ordinary combustion, an opinion which was previously entertained by Mr. Pearson, (Philos. Trans. 1813, part. ii,) there was no recorded fact that could be regarded as furnishing undeniable evidence of the accuracy of this opinion till lately, when a case of this kind occurred in a patient admitted into the infirmary of Edinburgh. The medical public are indebted to the late Dr. J. C. Gregory, who had charge of the patient, for the history of the case, the description of the post-mortem appearances observed in the body, and particularly in the lungs, together with the results of the chemical examination of the black matter found in this organ.* The following are the morbid appearances which were found in the lungs of this patient after death: "Both lungs presented one uniform black carbonaceous colour, pervading every part of their substance. The right lung was much disorganized, and exhibited in its upper and middle lobes several large irregular cavities communicating with one another, and traversed by numerous bands of pulmonary substance and vessels. These cavities contained a good deal of fluid, which, as well as the walls of the cavities, partook of the same black colour. A considerable portion of the pulmonary substance surrounding them was dense, hepatized, and friable. The rest of the lung was also somewhat condensed, and very œdematous. The serum, when expressed, was of the same black colour as the substance of the lung. The left lung did not appear to contain any cavities, but was condensed, and loaded with black serum. Some minute hard points could be felt in various parts of both lungs, but they did not differ at all in colour from the surrounding substance; and no distinct tubercular deposition or infiltration could be detected in those portions of the lungs which were most hepatized, even with the aid of the microscope. The texture in these parts appeared quite uniform, and the minute hard points felt in other parts rather conveyed the impression of their being merely the ends of small bronchial branches divided in making the section. The bronchial glands did not appear enlarged, but partook of the same black colour as the substance of the lungs." No other organ of the body presented any trace of this black discoloration. As a minute analysis of the black matter contained in the serum which was expressed from the substance of the lungs was made by Dr. Christison, we shall offer no apology to the reader for giving, in his own words, the results which he obtained.

"1. Concentrated nitric acid boiled on it did not alter the colour.

"2. Immersion in a strong solution of chlorine had also no effect.

"3 A strong solution of caustic potass boiled on it took up some animal matter, and filtrated very slowly The first part which passed through was opaque and black; but the last portions were of a pale yellowish-brown colour, and transparent; so that none of the black matter was dissolved. The black matter remained in the filter, and this, well washed and dried, burned like charcoal powder, without swelling up, and with scarcely any animal empyreuma, leaving a considerable pale-grey ash.

"4. A small portion of black powder, left after the action of boiling nitric acid, was well washed, dried, and introduced into a minute glass ball, with a tube attached, which was subsequently drawn out, by means of the spirit-lamp flame, to a fine bore. On the application of a low red heat to the ball, there was disengaged, at the open end of the tube, a considerable quantity of gas, which had the odour of coal gas, and on the approach of a light, took fire and burned with a dense white flame. In the tube a dark yellow fluid likewise condensed, which had very exactly the odour of impure coal-tar, naphtha, and became a soft mass on cooling, of the consistence of lard. This, when compressed between layers of filtering paper, yielded an oily stain to the paper, and left a white matter which dissolved in boiling alcohol, and separated again on cooling, in the form of minute obscure crystals."

"In the product of this experiment," says Dr. Christison, "it is scarcely possible not to recognise the ordinary products of the distillation of coal. A gas of the same quality was procured, and likewise a napthous fluid, holding in solution a crystalline principle, analogous to, if not identified with, napthaline."

The history of this case, the morbid appearances found in the lungs, and the results of the chemical analysis of the black matter in particular, do not permit of a doubt as to the origin and nature of the black discoloration of the lungs in this interesting case. The profession of the patient, which exposed him to the habitual inhalation of the coal-dust always contained in the atmosphere of a mine, and the black matter found in the lungs consisting essentially of this substance, are circumstances which demonstrate clearly the origin of the black matter, and its identity with the carbonaceous powder inhaled with the air in breathing. Besides these circumstances, the non-existence of any kind of black discoloration in any other organ of the body would furnish a strong reason for our not regarding this case as one of true melanosis. We have, indeed, never seen, nor do we know of, a case of melanosis occupying the greater part of an organ, without other organs being simultaneously affected to a greater or less extent with the same disease. Aware of this fact, we have always entertained doubts regarding the real nature of a case of black discoloration of the lungs which we had an opportunity of examining several years ago, which occurred in a middle-aged man, who was an out-patient of the Old Town Dispensary of Edinburgh. He was attended by Dr. Probart, of Bury St. Edmunds, who was then in Edinburgh, along with whom the writer of this article examined the body after death. The morbid appearances observed in the lungs were in almost every respect the same as those that have been detailed in the preceding case. The whole of both lungs was perfectly black; in many parts indurated and œdematous—in others softened and excavated. There were no tubercles, nor was

* Case of peculiar black infiltration of the whole lungs, resembling melanosis, by J. C. Gregory, M. D. &c. Edin. Med. and Surg. Journal, No. 109.

there any similar discoloration in any other part of the body.

Dr. Allen Thomson has informed us that he has likewise seen a similar case of black discoloration of both lungs. No analysis of the black matter in either of these cases was made; and besides, not having been able to ascertain the profession of either of the patients, our opinion with regard to the origin and nature of the black discoloration of the lungs in both cases, must be founded entirely on the anatomical facts to which we have alluded, viz. the universal black discoloration of both lungs, and the non-existence of any similar discoloration of any other organ or tissue of the body.

[Since then, many other cases have been observed. The affection has received the name of black lung of coal miners, and by Dr. Stratton (*Edinb. Med. & Surg. Jour.*, April 1838, p. 490) it has been termed *Anthracosis.*]

It is surprising that no case of universal black discoloration of the lungs produced by the inhalation of carbonaceous matter is to be found on record previous to that of Dr. Gregory, when we reflect that so many individuals are daily exposed in this country to the cause by which it is produced. We can hardly attribute this silence, on the existence of such a conspicuous morbid state, to the paucity of post-mortem examinations. Is it not more probable that the accumulation of the carbonaceous matter in the lungs is determined by a morbid state of these organs?—that, although carried into the lungs with the air, it is removed by expectoration or absorption, and its accumulation in these viscera thereby prevented? We are, indeed, much disposed to believe that these circumstances must tend to favour or prevent the occurrence of this diseased state of the lungs. In the cases referred to, we have not been able to ascertain that there existed any particular morbid state of the lungs which could have prevented or favoured the accumulation of the inspired carbonaceous matter. We, however, consider it a subject worthy the attention of the medical practitioner who has the opportunity of studying the diseases of persons employed in coal-mines, whether the black discoloration of the lungs is observed to occur in those only who have suffered from pulmonary complaints; although it may be often difficult to discriminate between cause and effect, between the original disease and the changes which must take place in the structure and functions of the lungs from the presence of the inspired carbonaceous substance.

Symptoms.—The symptoms presented by Dr. Gregory's patient as well as our own, were referrible to the presence of the inspired carbonaceous matter, acting, 1st, mechanically, and giving rise to atrophy of the pulmonary tissue, compression and obliteration of the air-cells, bronchi, and blood-vessels; and, 2d, as a foreign body, producing a greater or less degree of irritation. To these modifications of the pulmonary organs are to be ascribed the local symptoms, such as the dyspnœa, cough, the mucous and cavernous *râles*, and the increased secretion and expectoration of mucus. The presence of black matter in the expectorated fluids was no doubt to be attributed to the existence of a direct communication between some of the bronchi and the excavations formed in the substance of the lung. Although there were also softening and excavation of the lungs in the case which we examined, it does not appear from the account which we have received of the history of the case, that the sputa were discoloured by the admixture of black matter; and as it is stated that the mucous *râles* heard in this case were remarkably strong, but not *cavernous*, it may be presumed that the absence of the black matter was owing to there being no communication between the bronchi and the softened or excavated portions of the lung, or that the solidification of this organ was so great from the presence of the carbonaceous matter, that the former did not admit of being sufficiently compressed to expel any of this substance with the mucous secretion of the bronchi.

The general symptoms produced by the accumulation of the carbonaceous matter in the lungs, were chiefly the general cachectic condition of the body and anasarca, both of them depending on the state of the pulmonary circulation. The great diminution in the quantity of the blood admitted into the lungs, which must necessarily have followed the presence of such a quantity of foreign matter in this organ, as well as the imperfect change which must have been effected in that which was allowed to pass through the pulmonary vessels, will sufficiently explain the cachectic state of the patient. The anasarca must also be attributed to the same cause, viz. the presence of the accumulated carbonaceous matter, and its mechanical effects on the pulmonary veins, thereby giving rise to general venous congestion and effusion of serosity into the cellular tissue.

Diagnosis.—Being in possession of such a limited number of facts in regard to this singular, if not rare, affection of the lungs, we should not feel justified were we to assign to it characters by means of which it may be distinguished from certain organic affections to which the same organs are subject. We, indeed, know of no modification of function, local or general, by means of which this form of spurious melanosis is to be distinguished from true melanosis of the lungs. We may, however, suggest that, as the former pervades the whole of both lungs, dyspnœa may be greater than in the latter, which always leaves a portion, and often a considerable extent of lung in the healthy state;—that respiration will be found to be natural, or nearly so, in several portions of the lung affected with true melanosis; whilst in the spurious form of the disease, depending on the universal deposition and accumulation of inhaled carbonaceous matter, the respiratory sound, or at least the respiratory *murmur*, that which takes place in the air-cells, will either be greatly obscured or inaudible, and will be replaced by *bronchial* respiration, the *ronflement* and *sonorous râles* which accompany the solidification or condensation of the pulmonary tissue. We need hardly mention that the presence of black matter in the sputa cannot be regarded as a *pathognomonic* sign, unless its real nature has been determined by chemical analysis.

The only other disease with which this spurious form of melanosis is likely to be confounded, is chronic catarrh. We are, however, disposed to believe that the presence of anasarca, as well as

the dull sound of the chest on percussion, will be sufficient to enable us to distinguish the former disease from the latter, in which the sound of the chest is not materially affected, and which is not accompanied with anasarca, unless it be complicated with disease of the heart. The emaciation, diarrhœa, and hectic, which accompany phthisis, will prevent the physician from confounding this disease with spurious melanosis of the lungs, even when the latter has given rise to softening and excavation of the pulmonary tissue.

Treatment.—Imperfect as the description may be which we have given of the changes produced in the structure and functions of the lungs, originating in the inhalation of carbonaceous matter, and in its accumulation in these organs, it is sufficiently obvious that neither the local effects to which the presence of this foreign substance gives rise, nor the general disturbance of nutrition and circulation which follows as a consequence of the former, can be remedied so long as the offending cause remains. How far the removal of this can be accomplished by means of remedies which act chiefly on the absorbent system, is a point which remains to be determined by future observation and experiment.

If the disease has proceeded to such an extent as to produce general atrophy of the pulmonary tissue, softening and excavations in various portions of the lungs, its fatal termination must be inevitable. We cannot, therefore, too strongly impress on the mind of the physician who has the opportunity of doing so, the importance of ascertaining the early signs of this affection, as well as the influence which other diseases may have in favouring its production, as a knowledge of both circumstances will suggest the means to be employed either for its cure or the prevention of its occurrence.

B. *From the action of chemical agents.*—The next kind of melanotic formation which we have to describe, is that which is produced by the action of certain chemical agents on the blood.

Our attention was for the first time drawn to this subject nearly three years ago, while making a series of experiments on the chemical dissolution or digestion of the walls of the stomach after death. With regard to the subject of these experiments, it is necessary to observe, that the partial or complete dissolution of one or all of the coats of the stomach was found to take place after death, and to be the invariable consequence of the chemical action of an acid fluid contained in the cavity of that organ. A peculiar change in the colour of the blood contained in the veins of the stomach, was also observed to accompany the chemical dissolution of the walls of that organ, and which, though less frequent in its occurrence than the latter, was not the less obviously the effect of the same chemical cause; for, firstly, there was no discoloration of the blood when there was no softening or chemical dissolution of the coats of the stomach: secondly, the discoloration of the blood was observed only in the vessels distributed, or near, to those parts of the stomach which were softened: and thirdly, that both changes were, *cæteris paribus*, nearly in the same ratio as to degree and extent. Although these circumstances might have been regarded by us as affording sufficient evidence that the discoloration of the blood was produced by the direct operation of the same chemical agent by means of which the dissolution of the walls of the stomach was effected, we made several experiments on this interesting and important subject, the results of which leave no doubt as to the accuracy of our former conclusion,—viz. that the discoloration of the blood which accompanies the chemical dissolution of the walls of the stomach, is a direct effect of an acid fluid contained in the cavity of that organ, or, as we shall afterwards call it, the gastric acid.* If we kill an animal, a rabbit, for example, or open it while alive, and during the process of digestion, the fundus of the stomach is always found to contain a quantity of this acid, mixed with the food in this the depending part of the organ. When the stomach is laid open, a sour smell is immediately perceived to arise from its contents; and if a portion of litmus paper is placed in contact with the latter, it acquires, almost instantaneously, a beautiful red colour. If arterial or venous blood is allowed to flow into the stomach from some of the neighbouring vessels, so soon as it comes in contact with the digested portion of the food, or that in which the gastric acid is most abundant, its natural colour is almost immediately changed to deep brown or black. The rapidity with which this change takes place in the colour of the blood, as well as the degree and extent to which it proceeds, varies with the strength of the gastric acid and the quantity of the blood on which it is made to act. When the digested acid food, or the gastric acid alone, is removed from the stomach in which it was found, and is put into another stomach, or other organ, the vessels of which are conspicuous and filled with blood, this fluid very soon undergoes the same change of colour which we have said takes place when it is poured upon the digested food, and, consequently, when in immediate contact with the chemical agent by which this change is effected.

These facts show clearly that healthy blood contained in the cavity of the stomach, or in the vessels of that organ, in a dead animal, is changed to a dark brown or black fluid. But the influence of the gastric acid in producing this change in the blood, is not limited by the conditions to which we have just alluded. Not only is the blood that has been poured into the cavity of the stomach or is contained in the vessels of the mucous and submucous tissues, changed from red to brown or black, but likewise that of the sub-peritoneal vessels of the same organ is similarly altered. We have also seen the same black discoloration of the blood in the sub-peritoneal vessels of a neighbouring organ, such as the liver, spleen, intestine, or diaphragm, in contact with that portion of the stomach which contained half-digested food or gastric acid. Hence we can readily conceive that if blood is effused into the cavity of the peritoneum, and in the vicinity of the stomach, it will undergo the same change of colour as that which we have said takes place in this fluid when contained in its proper vessels beneath this membrane. We have

*We employ the term *gastric acid*, because it indicates the seat, and, particularly, the *property* of the chemical agent by means of which the dissolution of the walls of the stomach, and the black discoloration of the blood in that organ, are produced.

produced effusion of blood into the cavity of the peritoneum around the stomach, in several animals, and have thus been able to witness its conversion from red to brown or the deepest black.

The discoloration of the blood in these situations external to the stomach, and depending on the influence of the gastric acid, is an interesting fact, with the nature and origin of which we were entirely ignorant until we observed the effects of this chemical agent on the blood contained in the vessels of the stomach. It is perfectly obvious, from what we have said, that we have, in both cases, the same efficient cause. We have taken a portion of stomach containing gastric juice, placed it on a coagulum of blood or kept it in close contact with a portion of intestine on which there was a greater or less number of vessels filled with red blood. In both cases the blood assumed a brown or black colour, no doubt from the acid having been carried from the interior of the stomach by imbibition.

There is still another mode in which the black discoloration of the blood may be produced by the gastric acid, viz., when this fluid is effused into the cavity of the peritoneum through an opening which it has made, generally in the fundus of the stomach. It occupies the most depending parts, dissolves the tissues with which it comes in contact, perforates the diaphragm, and passes into the cavity of the thorax. Along with these remarkable effects of the gastric acid, the black discoloration of the blood is no less conspicuous in all the parts on which its chemical influence has been exerted.

Such is a very general sketch of the several modes in which the black discoloration of the blood is produced, when this fluid is exposed to the mediate or immediate influence of the gastric acid. We have already stated that this condition of the blood was not produced till after the death of the animals submitted to our experiments; that these animals were in the enjoyment of the most perfect state of health when killed; and that the gastric juice possessed that property—acidity—by which it is always distinguished during the act of digestion. These facts are the more important when we consider that they establish the formation of a series of changes in the blood after death, which are entirely independent of any morbid condition, local or general, of the animal in which these changes are observed. It is necessary, however, to state that there are two conditions in which the blood may be placed during life, which render it susceptible of being acted upon by the gastric acid: first, when it has ceased, during an uncertain period of time, to circulate; secondly, when it is effused into the cavity of an organ. In both circumstances it is deprived of those properties by means of which it is enabled to resist, to a certain degree, the destructive influence of external agents; and, therefore, undergoes the same changes when submitted to the action of the gastric acid, as it does after death.

Locality and Order of frequency of the Black Discoloration of the Blood, from the operation of an Acid Chemical Agent.—As the black discoloration of the blood of which we are now treating is produced by the operation of an acid chemical agent, it is consequently met with only in those organs in which this agent exists as a healthy or morbid product, or to which its influence extends in the manner which we have already stated. Hence, as the stomach is the only organ of the body in which an acid fluid is formed, and is at the same time a healthy product, the black discoloration of the blood is nowhere so frequently observed, so conspicuous, and so extensive as in this organ. The same discoloration of the blood, as to locality and order of frequency, occurs in the intestines, from the anormal formation of a fluid and gaseous acid product. It is owing to the proximity of the peritoneum to these normal and anormal acid products, that blood situated beneath this membrane on its free surface or in its cavity undergoes so often the change of colour in question; and it is to the same circumstance of situation that portions of the liver and spleen are so frequently found to present the same dark colour. The dark discoloration of the blood in the intestines and in the other situations just named, depends, perhaps, more frequently on the presence of sulphuretted hydrogen gas than an acid fluid in the former, owing, no doubt, to this gas possessing the properties of an acid.

Natural and accidental tissues, remote from the stomach and intestines, are also observed to present various kinds of discoloration; but we allude to those which chiefly depend on the presence of various shades of blue, brown, and black. The blue discoloration, which is sometimes very deep, approaching to black, is most frequently observed to occupy the walls of chronic abscesses in various parts of the body. It is not the consequence of putrefaction, but is produced by the presence of a chemical agent, the nature of which we have not been able to ascertain. The brown and black discolorations are observed to accompany the death of parts, preceded or followed by a local accumulation of blood. It is probable that they sometimes originate in the formation of an acid product, which afterwards acts upon the blood; although they are certainly owing, in general, to changes which take place in the blood itself of the dead part, for which reason we shall refer them to the fourth division of our subject, which contains the description of the black discoloration of the blood from stagnation of this fluid, and the subsequent changes which it undergoes.

Form, Situation, and Extent of the Black Discoloration of the Blood.

1. *In the vessels of the Stomach.*—The blood which undergoes this change of colour derives the peculiarity of the forms which it assumes from its being contained in its proper vessels. The three following forms are the most conspicuous: the punctiform, uniform, and ramiform. All these forms of black discoloration of the blood are met with either separately or combined, and may occupy a portion or the whole surface of the stomach. They are most frequently observed in the fundus of the stomach, for the reasons already assigned; but they may exist in other parts of this organ, as the pyloric portion, small and great curvatures, to which external causes, such as tumours, distension of the colon, enlargement of the spleen, &c., have given a more depending position than that of the fundus, consequently favouring the accumulation of the gastric acid in

these parts after death. The situation of these forms of black discoloration of the blood is also modified by the quantity and quality of the contents of the stomach. Thus, if the stomach is nearly empty, the discoloration of the blood is confined to the surface of the rugæ formed by the mucous membrane; and if it is distended by a quantity of gas, the discoloration is limited to the depending part of the organ, and terminates in a defined margin, the course and extent of which are determined by the superposed gas, which has prevented the gastric acid from acting beyond the limits within which it was thus confined. And, lastly, if the stomach is filled with gastric acid, as sometimes happens in stricture of the pylorus, the whole surface of the mucous membrane may present a uniform dark brown or black tint.

With regard to these three forms of the black discoloration of the blood in the vessels of the stomach, it is only further necessary to observe, that although the punctiform and uniform are more frequently produced than the ramiform, on account of the small veins being more often filled with blood than the large ones, the ramiform is most frequently seen; a circumstance which is owing to the mucous membrane and the minute veins within it and beneath it being sooner dissolved by the gastric acid than the large veins. In the punctiform discoloration of the blood, the mucous membrane presents an appearance as if it were dusted over with a quantity of fine charcoal powder; and when the discoloration is uniform, it appears as if painted with bistre or china ink, in the form of patches or streaks of various forms and dimensions. The ramiform discoloration is generally the most conspicuous and striking of the three, because of the black blood being contained in veins of considerable size. They appear as if they had been injected with chocolate or a mixture of soot and water. The dark blood presents a *curdled* appearance. It does not fill the veins, but is separated and agglomerated into small masses, which become gradually less towards the minute branches, and there appear in the form of black points, having still a ramiform distribution, but are no longer contained within the walls of the veins, the former having been dissolved by the gastric acid. This is the form of the black discoloration of the blood which we have said has been described as melanosis of this fluid, — an opinion which we hope the preceding details have shown to be erroneous.

2. *Black discoloration of the blood in the vessels of the intestines.*—From what we have already said of this change of the blood in the vessels of the stomach, we have only to add that it is less frequently observed in those of the intestines, is seldom so conspicuous, and that it assumes in general the punctiform arrangement. This character of the black discoloration in the intestines is owing to the change of colour taking place in the blood contained in the vessels of the villosites or isolated follicles. The black punctiform discoloration is sometimes observed to occupy the mucous membrane of the greater part of the intestines, both large and small; but we believe it is most frequently seen in the inferior portion of the ileon and in the duodenum.

A similar discoloration of the blood in the vessels of the villosites and isolated follicles is met with in various portions of the intestines in particular, and which is not produced by the action of an acid on the blood. It is the consequence of stagnation, and is not to be distinguished from the former otherwise than by ascertaining the nature of the contents of the intestines in which it is observed.

3. *Black discoloration of the blood effused into the cavity of the stomach and intestines.*—The fact of the black discoloration of the blood effused into the cavity of the stomach and intestines being produced by the chemical action of an acid fluid or gas contained in these situations, does not appear to us to have been even suspected till after the results of our experiments on this subject were made known. If we consult the works that have been published on melæna, (a disease characterized by the presence of black matter in the fluids ejected from the stomach and bowels,) we shall find that the opinions therein expressed, in regard to the black discoloration of the blood in this disease, were founded on mere conjecture.

By some pathologists the black discoloration of the blood was believed to take place in the venous system; by others, that it was not effected till after the blood was effused into the cavity of the stomach or intestines, and that the red colour of the blood was then converted into black by the fluid or gaseous contents of these organs. The latter opinion was, however, entirely conjectural, such conversion of the blood never having been *seen* to take place. Notwithstanding the importance of the subject, it was never submitted to the test of experiment. The matter of black vomit and dejections was *believed* to be blood *altered* in the stomach and intestines, but whether by a chemical or vital agent was quite undetermined. From the results which we have given of our experiments on this particular point at the commencement of this article, it must appear obvious that blood effused into the cavity of the stomach is almost immediately converted into a deep brown or black colour, and, moreover, that this change of colour is owing to the presence of a chemical agent; that this agent is an acid, similar in all its properties to that by means of which the dissolution of the food during digestion is accomplished. We have also stated that, if this acid fluid is not present, as is frequently the case, no such change of the blood introduced into the cavity of the stomach takes place — it preserves its natural colour: and again, that if the quantity of the blood be so considerable as not to be acted upon uniformly by the acid, only a portion of it is black, whilst the rest is of its natural colour. These circumstances relative to the presence or absence of the gastric acid, and the quantity of blood submitted to its action, appear to us to furnish the most satisfactory explanation of the essential phenomena of melæna. They further show that there is, properly speaking, no difference between this disease and hæmatemesis. Both of them originate in the effusion of blood, no matter how produced, whether by exhalation or a solution of continuity. In the latter the blood preserves its natural colour; in the former it is black, because of the reasons just stated—the presence of an acid in the one case, and its absence in the other. On

these circumstances alone can the pathologist be justified in making a distinction between hæmatemesis and melæna.

As this part of our subject is, as we have seen, intimately connected with the latter disease, we shall only further add, that the black discoloration of the blood in the stomach is found to accompany cancer of this organ much more frequently than any other disease. Black vomit almost always accompanies the last stage of this disease,—that is to say, the stage of softening, because of the hemorrhage which then takes place. Next in the order of frequency is follicular ulceration of this organ. In the intestines follicular ulceration is by far the most frequent change which is observed to accompany black dejections. In both organs the ulceration of the follicles is sometimes so extremely limited that it is not perceived until after the mucous membrane has been well washed and exposed to a strong light, when it is seen to occupy the central portion or orifices of the follicles in the form of a red point, with an irregular circumference, probably the ulcerated border of the orifices of these follicles. Next in the order of succession are the numerous diseases of the heart and its orifices, and several of those of the liver and vena portæ, which obstruct mechanically the return of the venous blood, and thus determine its effusion from the digestive mucous membrane. And, lastly, we have met with the same discoloration of the blood in individuals the most feeble and emaciated, in whom this fluid appeared to have almost entirely lost that plastic property on which its coagulation depends, and by means of which its effusion is prevented when accumulated in the capillary system.

The black discoloration of the blood in the vessels of the stomach, produced by the gastric acid after death, is a subject of the greatest importance to the toxicologist, particularly when considered in connection with the effects which result from the operations of all poisons possessing acid properties on the blood. Although we have directed our attention to this subject, and have been able to ascertain that several of the changes produced in the blood under these opposite circumstances are so characteristic as to afford us the means of determining their nature and origin, we are prevented from making any further allusion to them, because of the minute descriptive details, into which we should be obliged to enter, were we to attempt to put the reader in possession of the means whereby he might distinguish post-mortem from pathological black discoloration of the blood in the digestive organs. We must therefore refer him for further information on this subject to the article PSEUDOMORBID APPEARANCES.

4. *Black discoloration of the blood on the surface or in the cavity of the peritoneum.*—As we have already alluded to the manner in which the black discoloration of the blood takes place in these situations, we shall only notice a few circumstances of importance with regard to its seat, and the lesions which it most frequently accompanies.

We have already said that it is met with in the vessels which ramify under the peritoneum; but it is more frequently seen in those which exist in the false membranes of chronic peritonitis. When the blood is effused into the sub-peritoneal tissue, on the surface of the peritoneum, into its cavity, or into false membranes, the black discoloration which it undergoes is remarkably conspicuous, and frequently occupies a great extent of surface. It is only when the discoloured blood is contained within its vessels that it presents, in the situations just named, a ramiform distribution. There is, however, a peculiar modification of this form which requires to be noticed. It occurs in chronic tubercular peritonitis. The tubercles scattered over a greater or less extent of the peritoneum, are surrounded by a dark ring, or a multitude of minute vessels filled with black blood, having a stellated arrangement. If the tubercles are very minute, they are obscured by these appearances, and the peritoneum seems as if spotted with a deep brown or black pigment, which has been described as melanosis of the peritoneum.

The black discoloration of the blood when effused on the surface of the peritoneum or into false membranes, has still more frequently been taken for melanosis, and described as such. It then assumes the appearance of black patches, striæ, or layers of various extent, occupying either the visceral or abdominal portions of the peritoneum, or both at the same time. If the effused blood has collected in the cavity of the peritoneum, it undergoes the same change of colour which we have seen takes place in the blood effused into the cavity of the stomach and intestines. The external portion of the blood, or that which is in contact with the peritoneal surface of the intestines, is always deepest in colour, being sometimes as black as pitch; whilst that which is more remotely situated is either of its natural colour, or but slightly darkened. From these circumstances, and from what we have already said on the effects of the acid fluid and gaseous contents of the stomach and intestines, there can be no doubt that the black discoloration of the blood contained in the cavity of the peritoneum is owing to the chemical operation of these products. In confirmation of the accuracy of our opinion on this point, we may mention that we have had several opportunities of seeing the blood effused into the cavity of the peritoneum, undergo the change in question, in individuals who died from hemorrhage in consequence of wounds of the abdominal viscera. Although the description which we have given of the forms, situation, and extent of the dark discoloration of the blood in the digestive organs, and in those situated in their immediate vicinity, will in general enable the practical pathologist to recognise them in his post-mortem examinations, we would recommend him in all doubtful cases to *test* the contents of the former organs. A sour smell may not be always sufficiently strong to be perceived; and besides, his having determined (by means of litmus paper, for example, some of which he should always have in his case of instruments,) chemically, the presence of an acid, every doubt will be removed as to the nature of the black discoloration of the blood in the parts which we have named.

C. *From the stagnation of the Blood.*—Black discoloration of the blood has been long known to follow as a consequence of retarded or interrupted

circulation. This change in the colour of the blood is never so conspicuous as when it takes place in the extreme venous circulation, or in the capillaries; and it is only when it occurs in the latter situations that it has been described as a form of melanosis. We shall, therefore, confine our remarks to the black discoloration of the blood, which follows in consequence of the stagnation of this fluid in the capillary circulation. It is worthy of remark, that the black discoloration of the blood originating in this cause is much more frequently observed in some organs than in others, and is never so conspicuous or extensive in young as it is in old persons. The circulation of the capillaries being influenced by that of the heart and great blood-vessels, it is also frequently observed to accompany diseases of the latter organs, which impede the circulation of the blood in general, and give rise to a state of venous congestion. Among the local causes of its production, acute and chronic inflammation are the most frequent. This change in the colour of the blood has not, however, been regarded as a matter of much importance in acute inflammation; whilst in chronic inflammation on the contrary, it has received much attention, as its presence has been considered as one of the least equivocal characters of this disease. To these causes of the stagnation of the blood and its subsequent black discoloration, we may also add debility, which gives rise to similar states of the blood in depending parts of the body, but more particularly the inferior extremities.

Under the influence of these causes, the blood accumulates in the capillaries, and ultimately ceases to circulate. After a certain length of time it coagulates, and the serum is forced out along with the salts which are absorbed. That which remains is an almost black substance, of the consistence of firm fibrine, and is probably composed in great part of the animal principle and hematosine. The black colour thus produced appears to us to receive a satisfactory explanation from the circumstance that it follows the stagnation and coagulation of the blood, and consequently the separation and removal of the serous and saline ingredients of this fluid, to the latter of which, as has been clearly demonstrated by Dr. Stevens, its red colour is to be attributed.

The degree and extent of the black discoloration of the blood from stagnation of this fluid will no doubt vary in different individuals, in different organs, and under the influence of different diseases. Thus it is, generally speaking, most frequently observed in persons whose circulation is low; frequently, as we have already said, in the old and infirm, and seldom in the young and healthy; and in those diseases which mechanically or otherwise impede or interrupt the capillary circulation. As we have already extended this article far beyond the limits which we had originally prescribed to it, we shall confine the few remarks which we have yet to make on this part of our subject, to the presence of the black discoloration of the blood in particular organs and diseases, and some of its forms.

There are, strictly speaking, only two organs, the respiratory and digestive, in which this change of the blood bears any resemblance to true melanosis.

1. *Black discoloration of the blood from stagnation in the lungs.*—This change of the blood in the lungs occurs most frequently at an advanced period of life; in phthisis pulmonalis; in chronic catarrh; in emphysema; in dilatation of the bronchi; in induration of the pulmonary tissue; in disease of the heart; in one word, in whatever diseases impede the pulmonary circulation, and render the function of respiration imperfect. The black discoloration of the blood in the lungs is general, if the diseased condition in which it originates has exercised its influence on the venous circulation of these organs in general, as in disease of the heart; and it is confined to a limited extent, although it may occupy a greater or less number of separate points, when produced by local causes, such as tubercles. In the former case, the black discoloration of the blood is seen most conspicuously in the vessels of the inter and intra-lobular tissue. In the former tissue it has a ramiform disposition, in the latter it is capilliform and punctiform; appearances which are best seen on the serous surface of the lung. In the latter case, the vessels containing the black matter occupy the circumference of the tubercles, and have a stellated arrangement. In emphysema, dilatation of the bronchi, induration of the pulmonary tissue around tubercular excavations, the black discoloration is often very extensive, on account of the great obstacle which these morbid states oppose to the return of the venous blood, and the length of time which they have continued to operate.

Chronic inflammation of the pulmonary tissue gives rise to the same form of black discoloration of the blood which we have just said accompanies induration, because of induration being, in general, the consequence of this state of inflammation. Chronic inflammation of the lungs may, however, produce the same change in the blood without being accompanied by induration.

The mucous membrane of the bronchi seldom presents the grey or slate colour so common in the mucous membrane of the digestive organs,—a circumstance that would seem to indicate that these membranes are not exposed to the influence of the same agents to which we ascribe the black discoloration of the blood in question, in the respective organs to which they belong. Be this as it may, the black discoloration of the blood in the mucous membrane of the bronchi is seldom considerable, and is rarely observed, unless in old persons whose lungs are at the same time extensively affected with it. It is also best seen in the bronchi which communicate with tubercular excavations, and in the vicinity of ulcers of the mucous membrane itself.

Black discoloration of the bronchial glands, with regard both to frequency and degree, has appeared to us to occur under the influence of the same causes which give rise to the black discoloration of the blood in the lungs. It is most frequently seen and most marked in the bronchial glands of old persons, and it may occur even in children with tubercular phthisis.

2. *Black discoloration of the blood from stagnation in the digestive organs.*—This change in the colour of the blood is almost exclusively confined to the mucous membrane of the stomach

and intestines, and follows as a consequence either of chronic inflammation of that membrane, or of diseases of the heart or liver which impede the return of the venous blood. It is limited to a portion of the mucous membrane when preceded by irritation, and if it accompanies chronic ulceration of this membrane or of its follicles, it is often very conspicuous. When produced by an obstacle to the return of the venous blood, particularly if the obstacle is situated in the vena portæ, it may occupy the mucous membrane of the stomach and of the greater part of the intestines. In both cases the mucous membrane presents a grey, greyish-brown, or slate colour, which is either punctiform or uniform; and which, when examined with a lens, is seen to depend on the presence of a similar coloured fluid contained in the capillaries. The mucous membrane is at the same time thicker than natural, and the follicles and villositics are in some cases hypertrophied.

The appearances produced by the black discoloration of the blood from stagnation in the stomach and intestines, are very similar to those which are the effect of the chemical action of acid fluid and gaseous products contained in these organs. In order, therefore, to distinguish the former kind of discoloration from the latter, it is often nesessary to ascertain that no acid chemical agent is present. From the result of our own observations we are led to believe that the grey slate colour of the mucous membrane is too exclusively received as a physical character of chronic inflammation. That it does take place as a consequence of this pathological state there can be no doubt, inasmuch as we see it produced, for example, in the mucous membrane of the vagina and in the skin from this cause; but, as we have already observed, it is of comparatively rare occurrence in the bronchial mucous membrane, which is perhaps as often the seat of chronic inflammation as the mucous membrane of the digestive organs. It is on account of this circumstance, as well as from actual observation and experiment, that we are led to believe that this character of chronic inflammation of the digestive organs has frequently been mistaken for the discoloration of the blood produced by chemical action of the acid contents of these organs.

R. Carswell.

MENINGITIS. See Brain, Inflammation of.

MENORRHAGIA. This term (derived from *μήνη, mensis*, and *ῥήγνυμι, rumpo*) implies morbidly profuse menstruation. Some authors have attempted a distinction between those cases where the menstrual discharge is simply over-abundant, and those where, along with the peculiar menstrual secretion, pure blood is expelled. Dr. Mackintosh of Edinburgh, and Mr. Burns of Glasgow, have restricted the name of menorrhagia to the latter description of cases, calling the former only immoderate flow of the menses. Others, again, have chosen to class those instances where a mixture of pure blood is passed, under the head of uterine hemorrhage. The great object ought to be, not to mislead by too nice and critical refinement in nomenclature. The term uterine hemorrhage is so constantly limited in practice to cases unconnected with menstruation, and occasioned by organic disease, accidental injury, or the consequences of pregnancy or parturition, that it is much more convenient to include under the title at the head of this article all those instances of the discharge of real blood from the uterus which occur in connection with the menstrual functions. The cases, indeed, are very rare in which any strikingly profuse menstruation exists, without more or less of real blood escaping at the same time. Dr. Dewees states that, in a very extensive practice of many years' duration, he has scarcely ever known a case of genuine menorrhagia without the admixture of pure blood. (System of Midwifery, p. 147.)

Menorrhagia is a disease occasionally of great obstinacy, sometimes of alarming severity; and as much of the success of the treatment depends upon a proper discrimination of the different conditions which give rise to it, it becomes necessary to point out somewhat at length in what this difference consists. At the same time it must be acknowledged that it will be impossible to go minutely into every variety of case which may occur in practice.

Menorrhagia not only includes the immoderate quantity of discharge at each monthly period, the time remaining regular; but it is also understood to comprehend the too great frequency of the recurrence of menstruation, even when the quantity lost is not unusually abundant: still the definition of "morbidly profuse menstruation" ought to be remembered, because to constitute the disease the quantity lost must be relative. Many women remain in perfect health who are accustomed to a very considerable discharge regularly, thus menstruating every two or three weeks habitually; and yet, as long as the health continues unimpaired, or nothing more than has always been usual takes place, it would scarcely ever happen that medical advice would be applied for to abate the symptoms. In healthy menstruation the discharge takes place every twenty-eight days, lasts from three to four days, and the quantity lost upon an average is about five or six ounces. But this is merely a general rule: the exceptions are numerous; and it is only when it becomes an exception to the individual's ordinary habits, that disease should be considered to exist. The effect of climate in these cases is very remarkable; and what would be considered a very scanty menstruation in the warmer climates of the east, would be deemed menorrhagia in Lapland. A curious blunder was committed in this respect by Dr. Freind, who stated that the quantity of menstrual discharge in this country averaged about twenty ounces—a menorrhagic excess by no means common; the mistake arising from his having quoted Hippocrates without reflecting that the *δύο κότυλαι Ἀττικαι* applied only to the females of Greece.

Menorrhagia may occur in very opposite states of the system, and has therefore been divided into active and passive; the former arising from too great activity in the vessels of the uterus, the latter from a want of tone in their secreting orifices. Either of these states may exist in a plethoric habit of body, or in one of great debility; but in general the local condition is of the same character with the constitutional in the same individual. After a long continuance of the disorder, the

strongest and most plethoric frames are brought down to the state of weakness, and the active menorrhagia may thus become passive. In active menorrhagia, for a short time, sometimes for two or three days before the expected period, there is a sensation of unusual fulness about the pelvis, with throbbing referred to the situation of the uterus itself, along with sense of heat and weight; the external parts of generation are often slightly swollen, and the mammæ become hot, tumid, and painful. The circulation is quickened, the mouth hot, the tongue dry with thirst, and there is a general feeling of oppression, with headach and giddiness. After these symptoms have lasted for a certain time, the function of menstruation begins; but the discharge comes on with violence, in gushes, and usually accompanied with pure blood, as proved by the presence of coagula. The progress is then variable; sometimes after the first few hours the patient feels relieved, lighter, and cooler, and the rest of the period passes over more quietly and naturally; but in more aggravated cases the flow still proceeds in equal or increased quantity, and lasts for several days, occasionally subdued, but again breaking forth on the slightest exertion, till at the end of the period the patient is left weak and languid, with a feeble pulse and a pale countenance. By the time of the recurrence of the monthly period the individual is perhaps restored to the previous state of health; but the same train of circumstances is again renewed with perhaps increased severity; and the complaint rarely lasts long without the number of days intervening between the periods being rapidly diminished, till at last scarcely one period is over before the next approaches. The condition then quickly becomes one of passive menorrhagia, both local and general, the symptoms of which are more formidable, and the treatment more difficult.

The patient in passive menorrhagia is habitually languid and with feeble powers, or may have become so from previous long-continued loss of blood in the more active form of the disease. She is subject, perhaps, to palpitations of the heart, and violent headachs with throbbing and beating in the temples, singing in the ears, and giddiness—all arising, not from plethora or absolute determination of blood to the head, but from exhaustion and relative determination. This is a very important distinction, and one which has been too frequently and often fatally overlooked. For a further investigation of this interesting subject the reader is referred to the experiments of Dr. Kellie of Leith, and the practical observations of Dr. Marshall Hall; and also to the article BLOODLETTING in the present work. For the difference in the pathology of active and passive menorrhagia, we may also refer to the able article HEMORRHAGE, in which is comprehended much that will apply to the morbidly profuse menstruation, the circumstances being but very slightly modified by the periodical nature of the discharge, and the fact of its being merely an excess of a natural one.

In passive menorrhagia there are rarely any precursory symptoms; if the periods are still regular as to time, they are irregular and unnatural as to duration and the quantity lost. In general the return is also much too frequent, so that at last one period is followed nearly immediately by another, or there will be one continued discharge, varying from time to time in profuseness, from a mere oozing of a thin, half serous discharge, to the full gushes of coagulating blood. When apparently the discharge is safely over, the least excitement of body or mind, the slightest exertion or disturbance, will reproduce it, and the difficulties are again as great as ever. The usual effects of morbid loss of blood gradually or rapidly present themselves. When the complaint has been of long standing, but not very suddenly violent, the complexion becomes sallow and cadaverous; the countenance either pinched and emaciated, or bloated and anasarcous; the pulse rapid and feeble; the legs and feet, and often the whole of the cellular membrane distended with fluid; the respiration short and difficult; and, in fact, all the symptoms of confirmed and extreme cachexia are observed. But the most dangerous character of the complaint is manifested in the sometimes suddenly profuse menorrhagic discharge, the absolute danger being much influenced by the previous resisting power of the individual. In these instances alarming syncope has occasionally been brought on, and the most active measures become imperatively necessary, to rescue the patient, and prevent a fatal termination. Instances of death would no doubt be much more frequent, did we not possess very efficient means in general to arrest the discharge. Besides the exhaustion from the menorrhagia itself, it is nearly always the case that patients are afflicted in the intervals with profuse leucorrhœa; and if they are exposed to become pregnant, abortion will be very apt to follow. We have also frequently remarked that those who have suffered much from menorrhagia, are peculiarly liable to uterine hemorrhage after abortion or parturition at the full time.

There is one species of menorrhagia which is not uncommonly met with in practice, and yet has not, we believe, been noticed in books,—where, instead of the periods being regular to the month, or much more frequent than ordinary, the interval is protracted considerably, even to six, seven, or eight weeks. In these instances, whenever the menstruation is regular to the usual time, the discharge is not excessive; but upon any disturbance to the general health, there is more or less of delay, and the discharge is then morbidly profuse. This is common both with married and unmarried women; but when it takes place with the former, it is very frequently mistaken for abortion, being often accompanied by pain and the expulsion of solid masses of coagulated blood with flakes of albumen, not very unlike an early ovum. These women are said in common language to become *obstructed*, but it is under very different circumstances from amenorrhœa, as the protracted period is always followed by profuse hemorrhage. The patients complain for several days, even for two or three weeks, previous to the appearance of the discharge, of the symptoms mentioned as usually preceding active menorrhagia, and particularly of a more than ordinary sensation of pulse or throbbing in the situation of the uterus.

The causes of menorrhagia may be divided into the constitutional and the accidental; but it often seems to require a combination of both to excite the disease. The active menorrhagia is found to

occur in plethoric habits, often apparently as a natural relief to the overloaded system, but aggravated or excited by luxurious living, a sedentary and indolent life, hot rooms, and also by very violent exercise or any other fatiguing exertion. The passive menorrhagia, on the other hand, is caused by all those circumstances which lower the bodily powers, and weaken the action of the heart and arteries. But in both of these cases there are local causes which peculiarly tend to direct the mischief to the uterus, and increase the circulation in the vessels of that organ, leading to the increased discharge, whether that be the immediate effect of excess of activity, or diminished power of retention: such are blows and falls, or any other local violence; frequent and recent abortions, leucorrhœa, over-indulgence in sexual intercourse, irritation in the bladder, diarrhœa, tenesmus, piles, ascarides or scybala in the rectum, or even habitual or accidental costiveness.

In all severe or protracted cases, resisting the usual means of relief, it would be right to make an examination as to the actual state of the uterus itself, as symptoms closely resembling menorrhagia may be owing to organic mischief, particularly ulceration, polypus, and inversion of the womb. These causes are not immediately connected with the present article, and therefore can only be alluded to.

There is a frequent cause of menorrhagia not much attended to, and not mentioned in systematic works on the subject, but the knowledge of which is highly necessary. It has often been observed that the most obstinate forms of chronic menorrhagia occur in those persons who have an impeded or disordered circulation through the abdominal veins, particularly where there is organic or functional disorder of liver. The same cause will very frequently produce hemorrhoidal disturbances; and it is very easy to understand that the uterus in such cases will be a ready outlet for the over-distended blood-vessels of the lower part of the trunk. We have no doubt that this is not at all an uncommon cause of obstinate menorrhagia, and we are still more convinced of the truth of the opinion by the success which has often attended the adoption of a peculiar plan of treatment presently to be noticed, and which is only adapted to that condition.

Treatment.—In the treatment of menorrhagia it is especially important that we should inform ourselves as much, and as accurately as possible, of the actual state of the disease, and of the peculiar cause or combination of causes to which its origin may be attributed. It is too often the case that medical men in such instances, as a matter of course, order medicines containing infusion of roses and the mineral acids, and such-like. This is the every-day routine; and in more obstinate cases the astringent gums or metallic salts are added. But however proper such medicines may be in many, they are by no means applicable to all the cases, and much valuable time is lost by this careless mode of prescription.

In discussing the management of menorrhagia, we must bear in mind that sometimes we are called upon to arrest the violence of the discharge from the uterus at the moment, and which is occasionally so excessive as to hazard the life of the patient, unless readily restrained. We shall, therefore, in the first instance, treat of this highly necessary part of the subject, and afterwards of the mode of restoring the patient's health in the more chronic forms of the disease, and in the intervals of the discharge. In a patient who has been till recently in a robust and plethoric condition of body, and in whom the menorrhagia has been of recent origin, or has arisen from temporary and accidental causes, it will be often advisable during the actual profuseness of the discharge, to diminish the action of the heart and arteries by abstraction of blood from the arm, exactly on the same principle on which we should be led to similar practice in hemorrhage from the lungs. It is only in recent cases, however, or in very plethoric subjects, with a strong full pulse, that we may safely venture upon this plan; and then the quantity of blood abstracted must entirely depend upon the circumstances of the case, the powers of the patient being a much better guide than the severity of the symptoms. When the discharge is excessive, that alone will reduce the powers of life to so low an ebb that much additional loss of blood would be dangerous. After having abstracted blood from the arm, when the case requires this evacuation, we may proceed to the other measures, which are proper to all cases of urgent and immediate danger from menorrhagia. The free application of cold to the abdomen, pelvis, loins, and back, is one of the most powerful means we possess of restraining menorrhagia: the cold hip-bath, dashing cold water, or vinegar and water, on the person, injecting cold water into the vagina, and applying ice, both externally and internally, to the os uteri, may be had recourse to with much and often decisive advantage. It is necessary that in these cases the application of cold should not be intrusted to the nurse or attendants without the superintendence of the practitioner, as they are rarely aware of the mode in which alone the applications can be effectual. After placing cloths dipped in cold vinegar and water to the pubes, they often cover up the patient with the bed-clothes, *warm* and *comfortable*, soon converting the wet linen into a hot and reeking fomentation. Besides which, by the want of judgment, the application of cold, when properly applied in the first instance, will often become prejudicial from being continued too long. Cold is a most powerful sedative, and when the powers of life are reduced to an extreme state of exhaustion from loss of blood, it often becomes necessary for a time to reverse our treatment, and when the hemorrhage has ceased, to rouse up the sinking pulse and failing powers by the cautious application of stimuli and artificial warmth. We may do this more safely when we have made the state of the patient more secure, by another very effectual plan for restraining the hemorrhage—*plugging the vagina*. In the uterine hemorrhage which occurs shortly after parturition, this expedient is not safe; because, when the blood, by the plug in the vagina, is prevented from flowing externally, the uterus itself may again expand to a very considerable extent, from the blood being poured into its cavity; and in this way death may take place, although there is no external flooding. This can only happen, however, where the uterus

is in a condition to undergo the expansion, and in menorrhagia this is not the case. A dossil of lint, or a fine cambric handkerchief, may be gradually introduced into the vagina up to the os uteri, so as to fill the vagina firmly throughout its whole extent, and be allowed to remain there. Many prefer soaking the material previously in some strong astringent liquid, and this is, perhaps, still more efficacious. If a plug [or tampon] produce pain, it must be withdrawn; and at all events it should not be allowed to remain more than twenty-four hours, because it is apt to become very offensive and irritating from the putrefaction of the discharge. On withdrawing it, unless it be done very gently and gradually, a fresh discharge of blood is apt to be occasioned; but it can easily be restrained by another plug, or some of the other remedies.

Strong astringent injections into the vagina, consisting of solutions of alum or sulphate of zinc in infusion of galls or decoction of oak-bark, are often of service. They certainly possess great power, and act partly by coagulating the blood at the orifice of the uterus, which acts as a compress upon the mouths of the bleeding vessels. There is a remedy which is perhaps the most certain of any in restraining the discharge; but as it is not always safe, it should, in the writer's opinion, only be employed in cases where other plans less dangerous have failed — it is that of injecting the uterus itself with an astringent injection. A gum elastic male catheter is carefully inserted within the os uteri, and, by means of a syringe, a very small quantity of a solution of alum or of the acetate of lead is to be gently introduced into the cavity of that organ. Two instances have occurred, within the last four or five years, where violent vomiting was the consequence, followed by the uterine inflammation and death; and although certainly such unfortunate results of the practice are exceedingly rare, the knowledge of them must render any one cautious in applying it. Of course, where it is possible to ascertain the immediate cause of the hemorrhage, and that cause can be removed, our remedies will have but a poor chance if such a precaution be neglected. A loaded state of the rectum has been often overlooked in cases of menorrhagia, and even when recognised, many have been unwilling to produce any action of the bowels, from fear that the exertion or the disturbance might reproduce or increase the discharge. Accumulations of hard fæces in the rectum should always be removed as speedily as possible, and this may be safely and effectually accomplished by a lavement of cold water. This remedy alone, indeed, has often stopped an obstinate case of menorrhagia.

Of the internal medicines for restraining the discharge in the violent degree we have mentioned, opium and the acetate of lead are the most to be depended upon. Where the patient is much exhausted, opium may be given in large doses. Mr. Burns advises at least as much as two grains at once; and where it cannot be given by the mouth, it is to be introduced into the rectum as an injection or a suppositary. Many practitioners exhibit the acetate of lead in insufficient doses, dreading the deleterious effects which lead is known sometimes to produce in the animal economy.* When combined with opium, these effects are considered as less likely to be occasioned, and the usual practice has been to give one, two, and even three grains of the acetate of lead, with from half a grain to a grain of opium, every one, two, three, or four hours, according to the urgency of the symptoms. Dr. Mackintosh of Edinburgh has related a case (Elements of Pathology, vol. ii. p. 363) where the effects of the acetate of lead with opium were very strikingly displayed, in doses of five grains every three hours, for several successive times, without any of the signs of the poison of lead ever appearing. As opium will not always agree, and as the harmless effect of lead has been attributed to the opium being combined with it, it is very satisfactory that Dr. A. T. Thompson has lately proved that the addition of acetic acid to the acetate of lead, so as to make an excess of acid, entirely prevents the deleterious property. Other remedies have been given in the acute form of menorrhagia with success, and though not so much to be depended upon as those already mentioned, must not be lost sight of. Emetics have now and then been serviceable, but would only be safe where we wanted rather to depress the activity of the circulation. The same precaution is necessary with respect to digitalis, which has been much praised by several authors. Large doses of the nitrate of potash or of the oil of turpentine have been also highly spoken of. The most common remedies are the astringent ones, viz. kino and catechu in large doses, alum, sulphuric acid, rhatany root. Alum whey may be given as drink, or a very weak solution of sulphuric acid, made palatable with sugar.

[Many recent writers have spoken well of ergot in the dose of from five to eighteen grains, three times a day; but farther observations, as to its efficacy, are needed. The same may be said of monesia, which has been given by different practitioners in various forms of hemorrhage from the uterus. (See the author's *New Remedies*, 4th edit. p. 421, Philad. 1843.) Recently, Professor Simpson, of Edinburgh, (*Lond. and Edinb. Journ. of Med. Science*, July 1843, p. 661,) has highly extolled gallic acid, given in the interval, as well as in the flow, in doses of from 10 to 20 grains in the 24 hours, made into pills. It possesses, according to him, the advantage over most other hæmastatic agents, that it does not confine the bowels. He was first induced to prescribe it, from finding a case of very obstinate menorrhagia get well under the use of Ruspini's styptic, after many other remedies had entirely failed; and from its being alleged, that gallic acid is the active ingredient in that styptic. It has received high encomiums from Dr. Stevenson, in similar cases. (*Edinb. Med. and Surg. Journ.* July 1843, p. 183.)

The infusion of matico has very lately been given with great advantage where an internal styptic was needed. (*Braithwaite's Retrospect*, Part VI. art. 79 and Part. VIII. art. 7.)]

* Dr. Dewees states, in his "System of Midwifery," page 149, that sugar of lead has been declared a dangerous remedy, but "upon what ground we are at a loss to determine, having used it most freely for more than twenty years, without the slightest inconvenience from it." He relates a case where he gave it, as an injection into the rectum, in scruple doses.

In all these cases the most perfect quiet and the horizontal posture are indispensable.

In the more chronic form of the disease the above plans are more or less applicable, but much will depend upon the character of the individual case. When the individual is plethoric, bloodletting may be required; and in many cases Dr. Mackintosh has found advantage from the application of a leech or two to the os uteri itself. Cooling saline medicines may be taken, and the bowels kept open by saline purgatives, avoiding, however, any irritation of the canal. The infusion of roses with Epsom salts will be found one of the most useful forms of purgative, and if it irritates the bowels, henbane may be added. Cold hip-bathing, and also cold astringent injections, will be found useful. This plan, with great quiet, will be found to moderate the attack, and may be continued in the intervals; and it is worthy of remark that the next return of the menstruation may often be rendered comparatively trifling by the use of a full purgative about twenty-fours before the period, where that can be ascertained, avoiding any medicine of a drastic or stimulating quality. In these instances the diet should be very bland and spare: wine must be left off, although the common remedy in families for every sort of menorrhagia is to drink rather freely of port wine.

In the more feeble constitutions, already, perhaps, reduced by a long continuance of so debilitating a malady, besides the remedies above mentioned to abate the immediate violence of the discharge, we must endeavour in the intervals to strengthen the general frame, and restore tone to the uterus itself. But in these instances we often find it extremely difficult to restrain the discharge itself, however trifling it may be in amount. The least exertion or excitement will reproduce it, and in spite of all our remedies it continues day after day, exhausting the strength. Dr. Mason Good (Study of Medicine, vol. v. p. 66,) is of opinion that in these cases there exists a relaxed state of the solids and an attenuated state of the fluids; and certainly the discharge in nearly every such instance appears very thin, and to contain an unusual proportion of serum. Small and repeated doses of the acetate of lead are more serviceable, perhaps, than any other internal medicine, and it may be combined with opium or an additional quantity of acetic acid. The other astringents mentioned before are preferred by some authors, given in more moderate but more frequent doses. The ergot of rye, with the idea of its promoting contraction of the uterus, has been tried in menorrhagia in small and often repeated doses, and by some, it is said, with success; but others have had no reason to speak favourably of it.

In the intervals, every remedy which can give general and local power must be employed. Cold bathing, cold hip-bathing, especially, will be found of great use; and the efficacy of the water may be increased by the addition of salt or vinegar. This should be used from two to five minutes every night and morning, and a cold astringent injection should also be thrown up to the uterus. All violent exertions should be avoided, and especially shaking in an uneasy carriage, or horse-exercise. The free use of the flesh-brush will give steadiness to the circulation, and answer nearly all the salutary purposes of exercise, without the risk of mischief from too much fatigue or exertion. The diet should be nourishing, but not stimulating: fluids and the watery vegetables should be taken but sparingly, and only a small quantity of wine, of which claret or port is perhaps the best. Of medicines, the vegetable tonics are scarcely so serviceable as the mineral; but they may often be combined with advantage. The salts of iron require to be carefully administered; but in spite of their well-known effects of increasing or producing the menstrual discharge when deficient, their general tonic and astringent effect upon the blood-vessels is often exerted with marked benefit in cases of menorrhagia of the atonic character. The sulphate of zinc may be more easily managed than steel medicines, and in many instances has been more useful; from one to two grains being taken in the form of pill three times a day.

In a case of complication of obstinate skin-affection with menorrhagia, arsenic was found serviceable to the eruption, and during the exhibition of this remedy the menorrhagia ceased. This was quite accidental; but the writer was afterwards induced to try its effect in menorrhagia of the atonic character, where that was the only complaint; and the success of it has occasionally been very considerable. It has been given in doses of five to ten drops of the liquor arsenicalis, gradually increased to twenty-five, or thirty, three times a day, carefully watching the effect of the medicine, and diminishing the dose, or discontinuing it altogether, when the peculiar deleterious qualities have been evinced.

Perhaps no artificial medicines are so powerful in their action in chronic cases of menorrhagia as the natural medicinal springs, which contain minute portions of iron in solution; though some of the benefit may be fairly attributed to the change of scene and the purity of atmosphere.

In that congested form of menorrhagia which has been mentioned, accompanied by protracted intervals between the menstrual periods, much advantage is derived by abstracting blood from the uterus or from the neighbouring parts, whenever the proper day has passed over without the appearance of any discharge, and directly the sense of fulness and throbbing in the pulse is perceptible. The bowels also should be freely purged, and the feet put into hot water: in short, the treatment should be partly made up of that appropriate to cases of amenorrhea, modified by circumstances; whilst in the intervals horse-exercise and active exertion will be not at all improper but highly salutary. At the time of the actual existence of the profuse discharge, the most perfect quiet is essential, and those remedies which have been directed to alleviate the immediate symptoms.

In obstinate cases of menorrhagia, where we have reason to suspect the existence of a congested state of the liver, or an obstructed or rather a retarded circulation through the abdominal veins, before mentioned as a very common though seldom noticed cause of this disease, nearly all the usual remedies for menorrhagia will fail, and the great number of them will do absolute mischief. Although during the immediate flow of the dis-

charge, if violent, the remedies for checking it formerly mentioned become necessary, yet in the intervals we must direct our attention chiefly to the condition of the abdominal viscera. Small doses of alterative mercurial medicines, particularly the Plummer's pill, will be found very useful, and the decoction or extract of dandelion should be given in full doses. A pill of rhubarb, soap, and ipecacuanha, is a very advantageous combination to keep the bowels open, and this may be assisted, if necessary, by domestic enemata; it being of great consequence especially to prevent the collection of any hard or lumpy fæces in the large intestines. In addition to all this, the writer particularly recommends in all such cases the frequent application of a few leeches to the anus. Even in very debilitated and exhausted constitutions, this remedy, when carefully watched, may be safely administered, and relief will often be very rapidly manifested.

C. Locock.

MENSTRUATION, PATHOLOGY OF.—It is not intended in the present article to discuss the various theories of this important function of the human uterus, which have at various times prevailed. It will be sufficient to state generally that we consider the menstrual discharge to be the consequence of a peculiar periodical condition of the blood-vessels of the uterus, fitting it for impregnation, which condition is analogous to that of "heat" in the inferior animals. In Dr. Hooper's work "On the Morbid Anatomy of the Human Uterus," there is an exact representation of the uterus of a woman who was instantaneously killed by an accident during menstruation; and every one must be struck with the resemblance which it bears to the description given by Mr. Cruikshank in the Philosophical Transactions (1797) of the appearances observed by him in rabbits killed during the state of genital excitement, usually called the time of heat. The actual presence of the discharge is the *resolution*, if we may so term it, of the previous condition of the vessels which separate it; for the uterus is fitted for the purposes of impregnation before the menses begin to flow. An instance in proof of this may be given from the Philosophical Transactions (1817) of a young woman who bore two children successively without any previous menstruation; which function, in fact, did not show itself externally till after the third pregnancy, which ended in a miscarriage.

The function of menstruation lasts, upon the average, for about thirty years of the life of woman, beginning at puberty, and ending somewhere between forty and fifty years of age, unless interrupted by disease, by pregnancy, or by suckling. During this large proportion of female life there is a great liability to derangements, of one form or another, in the menstrual process; and to which much importance is attributed, though from some remains of the old doctrine that the menses were the outlets of "peccant humours," more anxiety is generally expressed in cases of diminished or suspended discharge than in those where it is unnaturally profuse. Women have also been always in the habit of considering the time of the first appearance of the catamenia, and of their final cessation, as requiring particular caution and management, and as tending to the development of a healthy or diseased condition for a long period of life. The actual flow of the menstrual discharge itself is also looked upon as a time of great delicacy, and as demanding peculiar attention; so that very few diseases can exist, and very few plans of treatment be recommended, without the presence of the menses in some way influencing the nature of the symptoms or the remedies to be applied. It is in this especially that the character of the female constitution in disease is manifested; for before puberty, and after the cessation of the menstruation, the female differs but little from the male in the character of disease, unless in those points which may be considered as accidental, such as organic diseases of the sexual organs.

In the present article we propose to consider the medical management of the female at the first appearance of the menstrual discharge, during the continuance of it, and at the final cessation.

Instances of precocious menstruation are by no means uncommon;* but occasional discharges of blood from the vagina of young children cannot be considered in this light, unless accompanied by the usual signs of puberty. Precocity must always be considered relatively as to climate, for the difference in hot and cold countries is very great. Dr. Denman has quoted an opinion of Hume (the historian), which is scarcely borne out by facts; the difference in the time of life when the menses appear being assigned as the reason why women in hot climates are almost universally treated as slaves, and why their influence is so powerful and extensive in cold countries, where personal beauty is in less estimation "In hot climates, women are in the prime of their beauty when they are children in understanding; and when this is matured, they are no longer objects of love. In temperate climates, their persons and their minds acquire perfection at, or nearly at the same time, and the united power of their beauty and faculties is supposed to be irresistible." (Introduction to the Practice of Midwifery, p. 83.) The influence of civilization seems to have been entirely overlooked in this theory; as otherwise the most chivalrous devotion to the fair sex would be found in the savage inhabitants of the countries of perpetual snow. Precocious menstruation can scarcely be considered as a disease, but it certainly is not desirable, for many obvious reasons; and as artificial circumstances may hasten it, avoiding such causes or counteracting them may not only prevent, but may even supersede it. For example, cases have been related in which girls have menstruated, with all the signs of puberty, at nine or ten years of age, in the East Indies; and having been removed to Europe, the function has ceased, without disorder of the health, and has not appeared again till the age of fourteen or fifteen, at which it usually comes on in this country. Hot and crowded rooms, luxurious habits, early excited passions, and improper indulgences, are well known to promote an early development of sexual power, and should be carefully counter-

* We refer in particular to a case by Dr. Wall, of Oxford, in the second volume of Medical and Chirurgical Transactions.

acted in those cases which seem to call for interference. An opposite condition to precocity is also very commonly met with; but however late the period may be at which menstruation first comes on, it is not a disease in itself, so long as the symptoms of puberty are not manifested. The parents of a young woman are often anxious upon this point, and request medical aid to bring on the menstruation; but, unless by attending to the general health, the practitioner is not justified in interfering. In some unfortunate instances, the signs of puberty never come on, from some organic deficiency in the genital organs, particularly the ovaria; and all attempts to excite a menstrual discharge would be pernicious.

For a very considerable period before puberty, often two or three years, symptoms of the approaching important change in the system may be detected. It is not at all uncommon to meet at this age with very obstinate disorders, such as headachs, epileptic fits, or cutaneous affections; and upon finding the usual plans of treatment fail, medical men are in the habit of prophesying a cure when menstruation is established: this arises from long experience of the frequent truth of such a result. As the time draws near, the system becomes more irritable; there is a general uneasiness, and an alteration of the moral character; there is also very commonly much languor, flushing, sensation of fulness, headach, livid marks round the eyes, disordered appetite, impaired digestion, and disturbed or unnatural heavy sleep. These symptoms continue for a longer or shorter period; and immediately preceding the first appearances of the discharge, there is much pain and weight, with fulness in the head and pelvis, and throbbings and swelling of the mammæ. Although the actual discharge is rarely quite regular to the month for the first half year or so, passing over a month or two, yet the usual constitutional symptoms just enumerated as directly preceding the discharge are found to observe the lunar intervals and to be aggravated monthly, even for some time before the flow of the menstrual evacuation itself. With many, the symptoms above mentioned are either so slight or so temporary, that no great attention is paid to them. Where medical aid is required, the plan of treatment must depend a great deal upon circumstances; as a general rule it is best to temporize, knowing that a little patience will carry the patient to the termination of the discomfort. Should there be any very great disturbance, with a full pulse and much headach, the abstraction of a small quantity of blood will be prudent. The diet should be carefully regulated, and abstinence from meat or wine strictly enjoined. The bowels should be kept rather more open than usual, but not with any of the more irritating and drastic purgatives, under the idea of exciting the uterus to action, as is too commonly recommended; the object being to lead the patient through the struggle without any force or disturbance. We should watch excess of action of every description, and restrain it, but not attempt to stimulate any apparent deficiency, unless actual disorder of health be manifested. Circumstances may arise, however, to call for more decisive measures; and the menstruation may be so protracted as to constitute one of the forms of *amenorrhœa*, the nature and treatment of which have been detailed elsewhere. (See Amenorrhœa.)

During the menstrual period, when quite regularly and properly performed, no medical treatment is required; but it should never be lost sight of, either by the patient herself or by her medical attendant, in case of any accidental illness, or any general plan of management of the health. Women expect this carefulness, from the great importance they habitually attach to the proper performance of the function; and therefore, in prescribing for females, it is always right to inquire as to the expected time, as well as the regularity of the periods, to guide us as to the propriety of continuing or remitting any part of the remedial measures. There are many things to be guarded against on these occasions which might be safely followed at any other time; and while much depends on the patient's own prudence, still the physician is constantly blamed if he lose sight of the necessary precautions. It is necessary to avoid any very active purgative medicines during menstruation, particularly those which irritate the lower part of the rectum, as they are apt to produce a morbid increase of the discharge. Medicines containing the preparations of iron, strong diuretics, emetics, myrrh, or mercury, are usually ordered to be suspended during the periods, although it is very doubtful whether the milder mercurial medicines in gentle doses can be productive of mischief. Cold bathing ought also to be discontinued, particularly the hip and foot baths; and yet it is a well-known fact that the dippers attached to the bathing-machines at the sea-side are in the habit of being for several hours in and out of the sea during the catamenial flow without detriment. Wetting the feet or exposure to rain under these circumstances has now and then suddenly suppressed the menstruation, and brought on illness of an alarming nature. Dr. Dewees states that in America it is not at all uncommon for young girls, bent upon a party of pleasure, to put the feet in cold water to stop the discharge. It need scarcely be stated that all vaginal injections to restrain leucorrhœa must be left off at these times. Any very violent exercise is to be carefully avoided during menstruation: partly because it is very apt to produce too profuse a discharge, and partly because, on account of the increased weight of the uterus and relaxation of the vagina, a serious degree of prolapsus uteri has been often occasioned by it. Some aggravated instances of this distressing complaint, even in unmarried women, have occurred in the writer's own practice, which have been brought on by dancing, by horse-exercise, and by over-fatigue in walking, during the menstrual period.

The Jews, and even more modern nations, believed that there was something deleterious and contaminating in the menstrual discharge itself; and hence various directions and regulations as to seclusion and cleanliness of person. It is not necessary now to controvert these doctrines, but it were well, perhaps, if more strict attention were to be paid to some part of the regulations even in the present times. Either by accident or by criminal impatience, sexual intercourse has sometimes been permitted during the period of

menstruation; and, although not constantly, yet such conduct has been frequently followed by the most serious effects—generally by profuse hemorrhage; at other times by a sudden suppression of the discharge; to which have succeeded fever, delirium, obstinate hysteria, confirmed mania, and even catalepsy. (See AMENORRHŒA.)

When the function of menstruation has been once fairly established, it may become disordered in several ways, each forming distinct classes of diseases. Menstruation may be faulty in respect to the quantity of the discharge, the quality of the discharge, the regularity of its appearance, the time of its duration, and the degree of pain with which the process is accompanied. When the discharge has been in any way suppressed in a peculiar condition of health, what has been called *vicarious menstruation* has sometimes periodically occurred from other parts of the body, the stomach, the lungs, the bowels, &c., although Dr. Dewees evidently doubts the existence of such anomalies. For a minute account of these several forms of disordered menstruation, the reader is referred to the articles AMENORRHŒA, DYSMENORRHŒA, and MENORRHAGIA.

During pregnancy and suckling, menstruation ceases. This is undeniably the general rule. Under the head of LACTATION, the exceptions to this law of nature, as regards *suckling*, have been noticed, and no one perhaps will deny their occasional occurrence. But many practitioners of extensive experience in midwifery have denied the possibility of menstruation going on during pregnancy, and declare the supposed cases to be either false altogether, or that the discharges which do sometimes occur during pregnancy are not menstrual, but are irregular in time, sparing in quantity, and sanguineous in character. They rest their arguments upon the fact, that at a very early period of pregnancy the os uteri is closed by the thick glutinous secretion which is poured out by the glands at the cervix; and also, that from the interior of the uterus being coated with the decidua vera, there is no surface from which the menstrual fluid could be secreted. Many experienced medical men, and women themselves in general, believe not only in the possibility, but in the comparative frequency of menstruation during the first three or four months of pregnancy; and Dr. Dewees mentions a case in which he was firmly convinced that it went on regularly to the *seventh* month, lasting three or four days, exactly as usual, not sanguineous, at least not containing perceptible coagula, and only differing from common periods in being less and less abundant as the pregnancy proceeded, after the fourth period. The first argument, as to the impossibility, is scarcely tenable, when we recollect how readily slight hemorrhages find their way through the os uteri in spite of its closure, from some accidental disturbances of the ovum at any period of pregnancy, without being followed by miscarriage; and if such discharges can escape, why not the menstrual? In reply to the second, Dr. Dewees asserts, that as menstruation occurs from the cervix uteri in the unimpregnated uterus, as well as from the body and fundus, there is sufficient space for some menstrual fluid to be secreted in that part of the cervix which remains uncovered by the deciduous membrane, and, as is well known, is not taken up into the body of the uterus till an advanced period of pregnancy. He states that a very small space will be sufficient for the purpose, as was proved by discovering in a post-mortem examination that the uterus of a young woman who had menstruated quite regularly and properly to the time of her death, retained only a surface healthy enough to perform the menstrual function, of the size of the finger-nail, all the rest of the interior being in a state of disease. In stating the opinions on both sides, it will be scarcely necessary to advert to our own; but, although firmly convinced that a perfectly regular discharge as to period is not uncommonly found to continue for the first two, three, or four months of actual pregnancy, yet we do not therefore conclude that such discharge necessarily comes from the uterus, or is exactly menstrual. In what the difference consists between the menstrual fluid and blood is not accurately known; that it does not coagulate is not saying much, as the blood of persons affected with scurvy, or of those killed by lightning or by some of the powerful narcotic poisons, does not coagulate; and menstruation is rarely very profuse without coagula being also expelled, no other secretion ever containing pure blood mixed with it, unless from organic lesion.

From habit, there is a tendency of the circulation towards the uterus every month, even during pregnancy; and few women are found who do not experience the symptoms occasioned by it, for the first month or two: hence it is that miscarriages are so apt to occur at those periods at which menstruation would have appeared, had not the process been interrupted by pregnancy; and hence, also, a periodical relief resembling menstruation may occur for the first few months, the blood-vessels at the cervix uteri, or the upper part of the vagina, giving way for the purpose. When this occurs, as it is unnatural, and might lead to abortion, great care is required; and when patients have shown a tendency to it, they should be kept in the horizontal posture for a few days, and a few ounces of blood be abstracted from the arm, or, by means of leeches or cupping, from the neighbourhood of the uterus. Although it is not pretended that these cases are common, and they can only be regarded as exceptions to a general rule, yet it is important that no one should blindly deny their possibility, since it might lead to a neglect of those precautions which pregnancy requires.

The important period of the cessation of the menses is liable to the same varieties as that occasionally observed on the first appearance, and is also accompanied with many very striking changes in the animal economy. It is an age which is always looked upon by the female sex with a certain degree of apprehension, as one in which the foundation is often laid of many a painful and dangerous malady; and yet those who previously are suffering from long-continued general illness or any obstinate chronic disease, are accustomed to look forward to the time when the constitution shall become *settled*, as it is termed, for a relief to their sufferings and a restoration to more perfect health. When the uterus is no longer in a condition to perform the function of menstruation, the

power of conception also ceases; and it has been considered by some authors that this was a wise ordination to prevent women from becoming mothers at so advanced an age that they would be incapable of properly attending to their offspring while still too tender to provide for themselves. As it has been generally acknowledged that the uterus is most fitted for impregnation directly before or after each menstrual period; so it also happens, that for a short time before that process ceases for ever, there appears to be an unusual degree of stimulus in the generative faculty; and many women who have ceased to bear children for years, or who have been hitherto barren through the whole of their married existence, at this time, to the surprise of their friends and of themselves, become pregnant. Still more commonly, however, does it happen that women mistake their condition under these circumstances, and so obstinately believe themselves pregnant, that it becomes exceedingly difficult to convince them of their error. It is easy to suppose that at this particular age such mistakes are likely to arise, for the symptoms that naturally accompany the cessation of the function much resemble those of pregnancy. Women are unwilling to be thought beyond the age of bearing children, and are perhaps on that account misled by their wishes; but they not unreasonably are struck with the first sign which generally occurs,—namely, the passing over of the menstrual period; and their attention is ready to seize hold of every flattering explanation of the circumstance. Other symptoms are soon manifested; the size increases, the breasts even become swollen and painful, the stomach disordered, and the appetite capricious, so that a pregnancy sickness is not uncommon; flatulence collects in the intestines, and whilst on this account the size still increases, the sudden motions and rolling about of the confined air are mistaken, even by women who have previously borne many children, for the plunging of a fœtus. It is only by time, or by an examination per vaginam, that the mistake is detected, much to the annoyance of the patient and her friends; but the symptoms are easily removed by the free exhibition of carminatives and purgatives, the use of active exercise, and bandaging the distended abdomen, which has probably been allowed more room to expand than formerly, from a fear of tight lacing in pregnancy.

In this country the average age at which women cease to menstruate, or "*the time of life*," as it has been called, is forty-five. Where they have begun early, it generally ceases early; and, on the other hand, where they have begun late in life, it often lasts much later than common. Some women have ceased entirely before the age of thirty; others have gone on to nearly sixty, or even beyond this period. Many of the cases, however, which have been related of women who have continued to menstruate till seventy, eighty, or upwards, or who have begun again ten or fifteen years after having apparently left off for ever, were not genuine cases of menstruation, but sanguineous discharges, generally irregular, and arising from some disease of the uterus.

Menstruation ceases sometimes at once, when the female has arrived at the usual age; but this rarely happens, unless accidentally, as it may be termed. For instance, something or other takes place to check the expected discharge, which would have had the same effect at a much earlier age, such as cold, fright, some acute illness, or any other fortuitous occurrence. At any earlier period the menstruation would return on the cessation of the illness; but now it seems to take the opportunity of departing without further trouble, and never again appears. Much more frequently the change is gradual, and accompanied with such irregularities that it has not inaptly been called "*the dodging time of life.*" The quantity varies much as well as the regularity of the return; sometimes for two or three successive periods it is extremely scanty, and then suddenly is so profuse as to partake of the character of uterine hemorrhage, and even to create alarm as to the immediate result. The discharge sometimes returns every two or three weeks, and then ceases for several weeks, or even months, and afterwards perhaps for a time recurs as regularly as usual. In females in whom it has been always previously the most regular, and when the person has been uniformly healthy and of temperate habits, the cessation of the function goes off the most quietly, and with the least subsequent derangement of the system. Many, however, who have not been so fortunate in their state of health, by being carefully conducted through this critical period, have apparently renewed their existence, have lost their previous delicacy of constitution, and become more healthy than ever; so that it has been remarked that their lives are likely to be prolonged to a more advanced age than men of equal standing and at the time of equal health.

But this is the most favourable termination of the period; for with many it is only the beginning of a train of great suffering and of constant illness, ending in an early death.

[It would not seem, however, that this *critical age, critical period*, or *critical time of life*, as it has been termed, is so full of danger as the epithet 'critical' might suggest; for the statistical researches of De Chateauneuf, and of Lachaise, Finlaison, (*Reports on the Evidence and Elementary Facts on which the Tables on Life Annuities are founded*, Lond. 1829,) and others, have shown, that between the ages of forty and fifty no more women die than men. (D. Davis, *Principles, &c. of Obstetric Medicine*, i. 290, Lond. 1836, and Desormeaux and P. Dubois, in *Dict. de Méd.* 2d édit. xix. 467, Paris, 1839.) M. Constant Saucerotte has, indeed, attempted to establish, by statistics on a great scale, that the mortality amongst women is greater between the ages of thirty and forty than between forty and sixty; and Muret, in his statistics of the Pays du Vaud, did not find between forty and fifty a more "critical" age than between ten and twenty. (Churchill, *Outlines of the Principal Diseases of Females*, Prof. Huston's edit., Philad. 1842.)]

Whenever there is any tendency to organic disease, or any weak point in the frame, this is the time when the mischief becomes manifest, and the symptoms are first detected. It is not, as Dr. Dewees has very properly remarked, that the particular diseases are caused by cessation of the menses, but the seeds of such affections already

existing are roused into activity by the changes which take place in the system at that period. For perhaps thirty years of the woman's life there may have been an habitual monthly discharge of from four to six ounces, more or less, of a secretion which is nearly allied to pure blood, from the uterus; and it is not surprising that, on this being stopped, the long habit should produce a tendency to the same relief every month; which not taking place, the excess is thrown back upon the circulation, and local congestions are the consequence. Even under the most favourable circumstances there are symptoms of congestion, shown by headach, shortness of breathing, oppression at the præcordia, and a tendency to corpulency. But whenever any organ is in a state of disease, however latent hitherto, the redundancy is thrown especially to that quarter, and the disease is rapidly called into activity.

It is not surprising, from the great alteration which takes place in the organs connected with the function itself, or those which have been particularly affected by it, that they should be the parts most liable to become diseased at this time; and certainly most organic diseases of the uterus and mammæ date their perceptible origin from this period. Besides cancerous tumours, medullary sarcoma, hæmatoma or fungus hæmatodes, attacking the uterus and breast, many serious diseases of other parts often arise. Apoplexy is not an uncommon occurrence, but is not so often fatal at this age as at one more advanced. Organic disease of the liver or of the other abdominal viscera is much more common than of the lungs, the abdominal circulation being perhaps more closely influenced by the want of the uterine secretion. Very obstinate disorders of the skin frequently make their appearance at this age for the first time, producing great distress and disorder of the health. There is sometimes an apparent effort of nature to substitute some other discharge as a compensation for the one which has been suspended; and it is right always to respect these contingencies, as, however disagreeable they may be, the removal or cure of them may be dangerous. Leucorrhœa is a very common instance of this natural relief; and discharges of blood from the hemorrhoidal veins is another, which now and then becomes periodical. Ulcers sometimes form and discharge copiously, on the legs or behind the ears, and should not be carelessly healed, unless other measures are taken to prevent mischief.

The medical management of the important period of cessation of the menses may be easily collected from what has been already remarked. Recollecting the condition of the system, particularly of the circulation, it will be necessary to keep it free from disturbance as much as possible, to relieve any organ or part of the body which may appear oppressed or in a state of congestion, and to watch carefully the first threatenings of any local disease. Should the pulse be full and hard, and should there be any general plethora, frequent small bloodlettings will be advisable. Every local pain, heat, or sensation of fulness, should be relieved by leeches or cupping. The bowels should be kept carefully and freely open by purgatives which do not irritate, but which produce watery motions, such as the neutral salts or castor oil. If the pulse is habitually quick and hard, small but repeated doses of mercurial medicines may often be of service, and remove any obscure inflammatory action which may insidiously be going on. The diet should be mild, and moderate as to quantity, meat and wine either omitted or but sparingly allowed. Exercise must be regulated by the circumstances of the case; it is very desirable where no local mischief appears to exist, as it promotes regularity of action and general health; but otherwise great quietude should be observed. The production of artificial discharges by means of issues, setons, or perpetual blisters, so much in vogue formerly, is now no longer fashionable, from the dislike patients have to such remedies; but viewing what is often effected naturally, we cannot doubt but that their more frequent employment would be highly advantageous.

In some peculiar constitutions most of the disturbance consequent upon cessation of the uterine functions seems to attack the nervous system, and hysteria, epilepsy, or mania sometimes takes place. The management of such cases requires some modification in the treatment above recommended: conium has been found of great service by some; and now and then even mild tonics are required to steady the irritable condition of the frame. When such diseases arise for the first time at this period of life, they generally prove obstinate, and often incurable. Some have proposed to attempt to reproduce the menstruation, as a means of relief when any of the formidable disorders above mentioned come on, by the employment of violent remedies of the emmenagogue class; but this practice might be highly dangerous, and probably excite uterine diseases of the most fatal description.

C. Locock.

[MENTAGRA. See Sycosis.]

MESENTERIC DISEASE. See Tabes Mesenterica.

MILIARIA.—This term, derived from *milium*, a millet seed, is applied to a minute vesicular eruption which occasionally appears in the progress of various acute disorders, the vesicles resembling in size and colour the seeds of the millet plant.

It has been regarded by some authors as an idiopathic eruptive fever, to which the name *miliary fever* has been given. By many of the older writers it has been confounded with scarlatina and rubeola; and from its having been occasionally observed to co-exist with purpura, the idea probably first originated that it was only a modification of this eruption. We have also on record several accounts of an epidemic miliary fever,* which has at various times prevailed, though it is evident that the eruption was only an accidental or symptomatic affection, and as little entitled to characterize an epidemic as petechiæ that appear in some epidemic fevers, and from which the disease has been termed *petechial* or *spotted fever*.

The miliary eruption appears in the form of small round vesicles about the size of a millet-

* *Pujol*, Mém. sur la fièvre miliare qui régna en Languedoc et dans les provinces limitrophes, durant le printemps de 1782. *Rayer*, Histoire de l'epidemic de suette miliare qui a régné, en 1821, dans le département de l'Oise.

seed, surrounded by slight inflammation. It is most abundant on the neck, breast, and back, but is less copious on the face and extremities, and sometimes comes out in irregular patches, frequently appearing and again disappearing without evident cause. The vesicles are at first so exceedingly small that they can hardly be distinguished except by their roughness: when examined through a lens, the round, vesicular form of the eruption (each vesicle containing transparent lymph) is distinctly visible, though, from the red colour of their under-surface being transmitted through the transparent pellicle, they are of a red colour; the lymph, however, becomes, in the course of twenty-four or thirty hours, opaque, and thus gives a pearly white appearance to the eruption. From this evidently originated the two varieties mentioned by the older writers; the *red* and the *white* miliaria, (*rothen friesel* and *weisse friesel* of the Germans,)—a distinction not only unnecessary but unfounded, as it is apparent that both these supposed varieties are only different stages of the same eruption.

Miliaria is sometimes rapid in its progress, and the eruption copious and generally diffused: in other instances it is partial and slow, and though the vesicles are usually distinct, they sometimes cohere and become confluent, and thus assume the form of phlyctenæ or small bullæ.

Its duration is various: it sometimes passes off in a day or two; the vesicles either breaking, or the lymph being absorbed, slight desquamation of the cuticle terminates the disorder. According to Bateman, it frequently lasts from seven to ten days, and sometimes much longer: indeed, under the treatment formerly pursued, when the sick, according to the expression of Blackmore, lay "drowning in sweats," it was not uncommon for crops of vesicles to be renewed a second, third, or even a fourth time, and the whole disease to be protracted to nearly fifty days.

The only disease with which miliaria can possibly be confounded is *eczema*. From this it may be distinguished by its being invariably symptomatic of some acute febrile disorder, and by its rapid progress and short duration. Besides, in *eczema* the vesicles are usually confluent, and confined to a circumscribed or limited space, whilst in *miliaria* they are generally distinct, and much more numerous.

With regard to the diseases in the progress of which miliaria occasionally appears, we may observe, that since the introduction of the cooling regimen which now forms an essential part of the treatment of every variety of febrile disorder, it is comparatively rarely met with. In common, continued fever, even in the worst forms of it, when judiciously managed, its appearance is almost unknown. We cannot bring to our recollection a single instance out of the numerous cases which we have had under our care in the Fever Hospital, though we have had repeated occasion to observe it in the crowded, ill-ventilated apartments of the lower orders, when ventilation has been unattended to, and a stimulating regimen adopted.

Miliaria is more apt to appear among women after delivery than in any other circumstances. So frequent, indeed, was its occurrence half a century ago, that it was described by some writers as an epidemic among lying-in women. From the accounts given of the management after delivery, by those who witnessed it at the period referred to, there can be no question that the eruption was induced by the injudicious mode of treatment adopted. In later times, since the adoption of a more cooling plan of management after delivery, not only are febrile disorders less frequent and violent, but the miliary eruption is seldom observed; and when it does occasionally appear, its origin may be always traced to an over-heated atmosphere, over-loading the patient with bedclothes, and the stimulating regimen adopted by the poorer classes, under the mistaken notion that the parturient female may be thus prevented from *catching cold*. Miliaria is also a frequent accompaniment of the milk-fever, and of ephemera or weed, when the perspiration is injudiciously encouraged. Dr. Burns thinks that this is by far the most frequent form under which the miliary rash appears, but he states that it is sometimes observed in women who have been much reduced, but who are free from fever.

With other fevers, Bateman remarks, in which a similar method of treatment was pursued, though in a less degree, and the patient was confined to bed, the miliary eruption, with its attendant languor and exhaustion, was frequently conjoined, especially with catarrhal and rheumatic, and also with typhoid, remittent, and intermittent fevers. Whence the writers who have described the miliary fever, speak of it as being disguised under, or counterfeiting the characters of these fevers respectively. In the summer, indeed, when ventilation and coolness are not sufficiently attained or attended to, a slight miliary eruption is even now occasionally seen; a miliaria *clinica*, in fact, may be thus induced by any circumstance that confines a person to bed; as an accident, or a surgical operation, an attack of hysteria, a state of asthenia, &c. From the increase of cutaneous heat, connected with the exanthematous fevers of the nosologists, some degree of miliaria is liable to occur in them all, but more especially in scarlatina; and a few larger pearl-coloured vesicles also occasionally appear. (Practical Synopsis of Cutaneous Diseases, p. 245.)

The miliary eruption does not afford any relief to the symptoms of the disease on which it supervenes: it is generally preceded by an increase of the fever, and a sensation of heat, pricking, or tingling of the skin. A peculiar acid smell of the perspiration is also perceptible, though we apprehend, from this fetor of the perspiration being frequently noticed in various forms of fever in which there is no cutaneous efflorescence, its connection with the eruption is not satisfactorily established.

Though there be no proof of miliaria being contagious, several attempts to induce the disease by inoculation having failed, it is affirmed by Frank, (De Cur. Hom. Morb. Epit. tom. iii. sect. 322,) and other writers, to be often epidemic, and in some localities endemic. Rayer has given an excellent description of an epidemic miliaria, attended with symptoms of a malignant character, which proved in many instances rapidly fatal. From the account given by this writer, it seems to have prevailed epidemically, chiefly in Picardy,

Languedoc, and Normandy; but it is so little known at Paris, that many physicians have expressed their doubts of the reality of such a disease. From observations made during epidemic visitations, it appears that no age is exempt from it, though the greater proportion of cases occur in adults, and that females are more frequently the subjects of it than males.

In the epidemic which prevailed in the autumn of 1821, in the departments of the Seine and Oise in France, and which was very fatal, we are told by Rayer that the eruption was preceded by feverish indisposition accompanied by copious perspiration, which continued throughout the progress of the disease.

The eruption appeared generally about three or four days afterwards, first on the neck or around the ears, and spread to the chest and back, and thence over the abdomen to the inferior extremities. The rash was sometimes generally diffused; in other cases it was only partial; the vesicles being distinct, small, and diaphanous, though sometimes large and confluent, so that on some parts of the body large bullæ appeared. The odour of the perspiration was often extremely fetid, which continued in general during the progress of the disease.

The disorder was in many instances mild, but in the more severe cases inflammation of the mucous membrane of the intestines, or of the lungs, or of the brain or its membranes, supervened, and rendered the disease more dangerous.

Its duration was various. The more severe cases often terminated fatally within twenty-four or forty-eight hours. In the milder cases, it sometimes disappeared in eight days; more generally, however, it was protracted to the end of the second week, and sometimes lasted three weeks.

[One of these epidemics occurred in 1837, and another in 1841 and 1842. In one part of Dordogne, according to a report made to the *Académie Royale de Médecine*, by MM. Rayer and Bricheteau, of a population of 82,200 persons, 10,400 were attacked by the disease, of whom 800, or one in thirteen, died.]

Treatment.—From what has been stated of the nature of miliaria, it is evident that it is to be regarded only as a symptomatic affection. Free ventilation and a cooling regimen constitute not only the best means of preventing, but of removing the rash; therefore when it supervenes on acute diseases, the cooling antiphlogistic treatment is to be pursued. For this purpose the chamber is to be duly ventilated; the linen of the patient changed as often as circumstances permit; the thirst abated by cooling subacid drinks; the bowels regulated; and the diet should be of the mildest kind. Tonics have been often found beneficial, and none are better than the mineral acids—as the diluted sulphuric or oxymuriatic, which may be taken at intervals. When miliaria occurs as an epidemic, the same treatment has been successfully pursued; and when complications arise in the progress of the disorder, the particular local affection must be treated on the principles already fully detailed in the article Fever.

[The epidemic of Dordogne, referred to above, was found to prevail most in marshy situations, and to be treated most satisfactorily in the same manner as intermittent fever, by sulphate of quinia, and other tonics; particular care being taken not to interfere in any manner with the progress of the miliary eruption.]

A. Tweedie.

[MILK FEVER. See Lactation.

[MILK SICKNESS.—Under another head, (Art. Fever, Continued, vol. ii. p. 183,) a disease was referred to, which was, at one time, ascribed to a plant called by the natives of Tennessee *Indian hachy*. The vegetable poison was presumed to enter the circulation, without necessarily inducing injurious effects on the animal, but afterwards causing fever and even death in those who used its milk. Of late, many inquiries have been made into the nature and causes of this disease, which has also received the names of *trembles* and *sick stomach;* but we hear no more of its being occasioned by the vegetable above mentioned; whilst it has been ascribed to other plants—the *rhus radicans*, or *rhus toxicodendron*, for example, (J. J. McIlhenny on *Milk Sickness*, Springfield, 1843); and even to arsenic in the soil, (J. S. Seaton on *Milk Sickness*, Louisville, 1841.)

The discrepancy, amongst observers, as to its nature is indeed, surprising; some denying that it is a distinct disease, and regarding it as a form of gastro-enteritis (N. Crookshank); others considering it to be nothing more than an autumnal fever of a congestive type, attended with great irritability of the stomach. Thus far, the causes would seem to be wholly unknown; (J. Travis, *Western Journal of Medicine and Surgery*, Aug. 1840; G. B. Graff, *Amer. Journal of the Med. Sciences*, April, 1841, p. 351;) but, according to Professor Drake, (*Western Journ. of Medicine and Surgery*, Nov. 1841, p. 370,) in the state of Ohio, transforming the surface of the infected districts by the hand of art has been found infallible.

In man the disease is generally believed to be induced by using as diet the flesh or milk of animals infected with it; and it is affirmed by Dr. Graff, that butter and cheese, manufactured from the milk of a diseased animal, are the most concentrated forms of the poison, although they may possess no appearance, smell or taste, which distinguishes them from the healthy article.

It is affirmed by Professor Drake, that undue importance has been attached to the disease. The mortality from it, he says, is very small, compared with that from many other maladies, about the causes of which few inquiries are made. "There can be no doubt, that more persons annually die in the west from autumnal fever, than have died from milk sickness from the commencement of its settlement. Even in the districts where the disease is endemic, it does not destroy as many as pleurisy or cholera morbus."

The most appropriate treatment has been that adopted in remittent fever, modified according to the special indications.

Robley Dunglison.

MIND, ALIENATION OF. See Insanity.]

MIND, SOUNDNESS AND UNSOUNDNESS OF. (As a treatise on Mental Derangement is incomplete without a consideration of various medico-legal questions connected with that subject, it may be thought that the contents of the present article should have been comprised in the former one on *Insanity*. The reader will perceive that the subjects now entered upon are treated in a more comprehensive manner than such a connection would allow. Under *Unsoundness of Mind* are comprised several defective states which do not come under the head of Insanity. For this reason it is more consistent with propriety and distinctness of arrangement to take up the consideration of all these subjects in a separate article, for which no more suitable inscription could be devised than that here adopted.)

What constitutes soundness and what unsoundness of mind? In other words, by what distinguishing circumstances are we led to pronounce as to the presence or absence of such a state of the mental faculties as renders a man incompetent to the management of his affairs, and absolves him from moral responsibility? Is this state of the understanding absolute, and, if it exists at all, extending to all cases and varieties of circumstances, or does it admit of degrees and modifications? Of these and several other subordinate questions physicians are liable to be called upon for a solution, and for such a solution as may facilitate the judgment that is to be formed in particular instances; in those especially which present circumstances of unusual doubt and perplexity. The conditions on which depends unsoundness in the mental faculties are various disorders or defects in the functions or structure of the brain. With such states of that organ, and with their manifestations, persons who profess the study of medical science are supposed to be conversant. They are accordingly expected to supply information as to the nature of such affections, their extent and duration, their distinguishing characters and ultimate results. The general facts and references which are applicable to these subjects constitute a part, and by no means an uninteresting division, of medical jurisprudence. This department of legal medicine may be said to comprise all that may tend to elucidate the various questions which arise in connection with mental disorders and defects; in the first place as to the relations which persons labouring under them bear to human society, and the alteration both in respect to rights and responsibility which arise from the circumstances of their state; and, secondly, as to the modes of proceeding which are requisite, in order as far as possible to secure such individuals and others from the injurious results connected with the peculiar condition of the former.

It is remarkable that our medical literature is particularly defective in respect to this branch of professional inquiry. Except the short treatise of Dr. Haslam, which is doubtless well known to our readers, we have scarcely anything in the English language expressly relating to this subject; and Dr. Haslam's work, although it displays in some striking remarks the strong sense which distinguishes the author, is much too limited in its scope and too discursive to furnish all the assistance which is required. By some German and French writers the subject has been treated in a more systematic and comprehensive manner. In the various works of Metzger, Heinroth, Reil, and Hoffbauer, and in particular treatises and occasional commentaries by MM. Esquirol, Georget, Marc, and others, almost every topic connected with the inquiries above defined has been considered and discussed, under the several relations of which it is susceptible; and from the different points of view selected by these writers, much information may be obtained. We shall endeavour to afford our readers, such of them at least as are not conversant with the original authors, an opportunity of estimating the value of these researches by laying before them in a short space a general survey of their results.*

By the writers above mentioned, the subjects of lunacy and mental incompetency have not been considered principally with reference to specific enactments or the decisions of lawyers in any particular country. This, indeed, is not the point of view in which such questions will be most properly contemplated by physicians. It is the business of medical writers to record facts as they present themselves to the observer of nature, and to found on a correct statement of facts such results as common sense, aided by the habit of reflection on similar topics, may enable them satisfactorily to establish. When this shall have been accomplished in a manner unexceptionable and commanding general assent, legal regulations must, and no doubt will, sooner or later, be made to accommodate themselves.

Of all the works on this subject with which we have any acquaintance, the treatise of Professor Hoffbauer is the most comprehensive; displaying at the same time the results of calm reflection, and long and extensive observation on the questions to which it relates. We shall, in the remarks which we have to offer, follow the plan of this writer, and take up the different points which offer themselves to our consideration nearly in the order in which he has surveyed them.†

The Roman law and the code of Prussia specify, incidentally, various defects and disorders of the mind, and in the latter compilation the terms employed are in some instances defined. The French code, in the opinion of Hoffbauer, has adopted a course which indicates the good sense of the legis-

* It should be mentioned that a large portion of Dr. Conolly's Inquiry concerning the Indications of Insanity is devoted to this particular subject.

† Herr Hoffbauer was not a practical physician, but a doctor of laws and professor in the University of Halle, who made psychology and diseases of the mind the particular subject of his studies. He is the author of several works on insanity and the inquiries connected with it. The first, entitled "Untersuchungen über die krankheiten der Seele, u. s. w." was published in 1802–1807. He afterwards published, in conjunction with Reil, the celebrated author of Researches into the Structure of the Brain and Nerves, a work entitled "Beyträge zur Beforderung eigner kurmethode auf psychischen wege." His most popular work, entitled "Die Psycologie in ihren hauptanwendunden auf die Rechtspflege nach den allgemeinen gesichtspunkten, &c." has been translated into French, with notes by the editor, M. Chambeyron, and additional comments by MM. Esquirol and Itard. Professor Hoffbauer shows, in many instances, a want of practical knowledge of insanity, but he has discussed admirably the legal relations of mental deficiencies. A critical analysis of his works has been given by Professor Heinroth, in his "Lehrbuch der Störungen des Seelenlebens," th. 2.

lator: it makes occasional references to the various classes of affected persons, whose states are distinguished respectively by the terms of Madness, Dementia, and Imbecility; but it nowhere determines the precise import of these expressions. "In fact all legislation ought to be founded on the knowledge of the objects to which it is applied; but this knowledge failing, it is better that the law should not define, than that it should define erroneously, and thus introduce errors which would only be perpetuated by its authority." The triple division which the French code recognises corresponds with facts, and with the actual distinctions of nature. In reference to mental disorders and defects we distinguish three very different states, involving mental incapacity. These are, *idiotism* or *congenital weakness* in all its degrees, depending on an originally imperfect formation or development of the brain; secondly, *insanity* in several forms; thirdly, *dementia* or *intellectual decay*. This last state, though considerably varied in particular modifications, is most frequently a permanent failure of the mental powers; it is the result of long-continued insanity, of old age, when life is protracted beyond its natural period; sometimes it ensues on apoplexy or paralysis, or on repeated and severe attacks of epilepsy: in other instances it appears as the sequel of fever attended with delirium; and in these last cases alone it often terminates in the recovery of health and a sound state of the mind.

The distinguishing characters of *dementia* have been described in the article Insanity, and we shall not recapitulate them at present, but merely remark that this morbid state is very distinct in its features from idiotism, as it is likewise from insanity. For medical purposes these distinctions must be carefully observed, but the same division is not in all respects the most advantageous with reference to legal questions, in which an account is to be given merely of the degrees of incapacity. Such, at least, is the opinion of the author whose method we follow. At present, we are disposed to adopt his arrangement in this particular, and in the first place to divide mental affections into two departments, which may be distinguished as defects and diseases of the mind. The former class comprehends the different modifications and degrees of natural deficiency as well as those of dementia or decay; the latter, all the forms of insanity, whether moral or intellectual.

I. Mental Deficiency.

Mental deficiency includes all the degrees of intellectual weakness, from the slightest appearance of dulness or incapacity to absolute fatuity. Different modifications of mental weakness are included under this head, whether arising from natural imperfection in the organ of intellect, or the consequences of disease: they are arranged according to the degrees in which the mind is found to be defective in its operations.

Before we proceed to this arrangement, we must distinguish, with Hoffbauer, two marked differences in the character of mental deficiency. One modification of this state is termed *imbecility* (*blödsinn*), and the other stupidity (*dummheit*). The former is said to consist in a defect of *intensity*, the other in a want of *extensity*. By intensity M. Hoffbauer describes the energy with which a sound mind applies itself to judge with accuracy on the objects of reflection, or on the data already furnished by the senses and by perception; extensity is a similar energy directed externally to sensation and apprehension, or to the acquisition of ideas. The former defect renders the intellect unable to examine with sufficient exactness the data on which j dgment is to be exercised, the latter renders it liable to suffer some of these data to escape. M. Chambeyron, the French translator of Hoffbauer, objects to this distinction. He says that until we can determine in each kind of mental alienation the precise nature of that cerebral change of which it is the symptom, it is better to follow the method of Pinel; to observe what are the phenomena which are generally grouped together, and of each of these groups to constitute a distinct species; a principle of arrangement which may equally be followed in the distribution of mental as of other disorders. This observation points out the only sound and philosophical foundation on which nosological distinctions can rest, but to us it does not appear to lead justly to a rejection of M. Hoffbauer's attempt to discriminate the different forms of mental weakness. There is in fact, if we are not mistaken, a marked diversity among men as to the relative degrees of energy in their internal and external faculties, meaning by the former the powers of judgment and reflection, of reason, the faculties by which the mind decides on truth and falsehood, right and wrong, and in general of relations; and by the latter the ability for external perception and apprehension. When the whole constitution of the mind is weak, so as to render the individual barely competent to the business of life, these differences are the more striking and conspicuous. Many persons whose power of judgment is very deficient have a tolerable share of quickness in apprehension; others, on the contrary, (and these often appear much more defective than the former class,) are slow of perception, and let many things escape them which would be observed by ordinary men, yet they make occasionally shrewd remarks, and give tokens in their conduct which indicate a sagacity much beyond the measure of intellect which common observers ascribe to them. M. Hoffbauer is correct in distinguishing two classes among weak and half idiotic persons. One of these may be described as *imbecile* or defective in judgment, in the powers of reason and discrimination, while the other or *stupid* class show their deficiency chiefly in obtuseness or slowness of perception and apprehension, and in a consequent ignorance of external things and relations.*

That form of intellectual weakness which is distinguished by the term imbecility differs in several respects from stupidity or obtuseness of the mental faculties.

"In reference to the faculty of judgment, it may be observed that the stupid or obtuse person is more liable than the imbecile to form erroneous decisions; the latter experiences great difficulty in bringing himself to any conclusion. Secondly, the stupid person sometimes judges very correctly on subjects to which his attention has been

* Hoffbauer has explained his ideas on the nature of "*blödsinn* and *dummheit*" more fully in his Untersuchungen, th. i. s. 9.

strongly applied; occasionally he comes even more directly to a right conclusion than those who are possessed of superior intelligence. When he errs, it is through neglect of some of the considerations which ought to have formed the groundwork of his judgment, and he will say, in order to excuse himself, that 'he should never have dreamt of this or that circumstance.' To the imbecile the most simple act of judgment is difficult: for instance, a lady who said that she was twenty-five years of age, and had been married six years, could not, after many efforts, tell how old she was at the period of her wedding. Thirdly, the stupid man may often be induced to correct his mistake, some particular circumstance being suggested to him which leads to its detection. The imbecile man can scarcely rectify his error, being unable sufficiently to concentrate his attention on any particular subject. The stupid man has not this defect, but he views every subject on one side only, and is embarrassed by every complex idea.

"In relation also to memory, there is a decided difference between stupid and imbecile persons. The latter appear to be almost entirely defective in this faculty: the former recollect after a long interval of time some insulated circumstances or transactions. The reason of these peculiarities is the total want of attention to present objects which is characteristic of the one state, and the partial but concentrated attention to them which is observable in the other.

"Weakness of intellect displays itself in both these classes of persons, when their defect is in a high degree, by a propensity which they have to talk to themselves. This is most observable when the affected individual is alone or supposes himself to be so. In reality, we employ words not merely for purposes of intercourse, but as an instrument of thought, and the weakest intellects require their aid in the most perceptible manner. When the mind is morbidly weakened, the silent and unperceived or the mental employment of words is insufficient: they must be repeated more or less audibly. This practice is not uncommon with imbecile and stupid persons, but when in society they generally perceive its incongruity and abstain from it. If, however, such individuals talk to themselves, knowing themselves to be in the presence of other persons, it is a proof of greater deficiency.

"Another distinction between the stupid and imbecile is that the former imagines himself to be at least equal to other men in intelligence, whereas the imbecile is ever conscious of his state, and even exaggerates his defect.

"This difference between them is easily explained, as well as the results which it induces in their conduct. The stupid act rashly and without reflection; the imbecile can never come to a determination. Hence, also, the imbecile becomes cautious, timid, and even misanthropic, unless when assured of their security by finding themselves under the protection of persons of whose kind intentions toward them they are well convinced: to the guidance of such persons they give themselves up with blind confidence.

"The pusillanimity and misanthropy of the imbecile lead them to a species of devotion, if such it may be termed. Supposing themselves to be despised and ill-treated by men, they are led to apply for support to the common resource of the unfortunate. The stupid, more confident in themselves, fancy that they acquire merit by their devotions, or confer a favour on the divinity."

This account of the phenomena of mental weakness might suffice for ordinary purposes, but the deficiency exists in different degrees, and one stage in the approach to idiotism has results, in respect to social relations, which do not belong to a different grade in the same scale. M. Hoffbauer has for the first time made the attempt to define the gradations of mental deficiency as a basis for suggestions on the legal bearings of this state in particular degrees. It was hardly to be expected that he should accomplish this undertaking at once in a manner wholly free from error, and requiring no correction or improvement. The outline which he has sketched is drawn with great ability, and is evidently the result of extensive observation, assisted by no ordinary talent for generalizing phenomena and tracing their connections. The subject is so important that we shall incur the risk of being thought somewhat prolix, and give an abridged extract of this author's description of the five stages or degrees into which he divides the affection of imbecility (*blödsinn*), and the three degrees of stupidity or obtuseness (*dummheit*).

"The *first* degree of imbecility manifests itself in the incapability of forming a judgment respecting any new object, even when the necessary data are furnished, and the question is one which in itself presents no difficulty: in this degree of the affection the individual can very well judge respecting objects to which he is daily accustomed, and in familiarity with which he may be said to have grown up; he often shows, in the pursuit of his daily concerns, a minute exactness which appears to him a matter of absolute necessity. His memory is very limited; not that he absolutely loses the remembrance of things, but because he cannot apply his recollections according to his wishes. He scrupulously observes whatever he thinks becoming in his situation, because he fears to give offence in neglecting it. When he gives himself up to avarice, there is observed in him rather an apprehension of losing than a desire of accumulation. The propensity to talk alone, and the species of devotion to which we have alluded, is seldom to be met with in this instance, the former because the routine of daily occupations, above which the individual seldom raises himself, makes but small demands on his intelligence; the latter because his infirmity is not so remarkable in ordinary society as to render it a subject of general observation, and entail upon him frequent annoyance, and thus make him feel the necessity of seeking support elsewhere. He is very subject to gusts of passion, which nevertheless are as easily appeased as they are excited."

The preceding description will be found to coincide accurately with many cases of mental defect arising from original or congenital weakness of the intellectual faculties. We could furnish instances from our own observation which strikingly exemplify it. The statement given of the second degree belongs obviously to dementia or

mental decay, and will be found very accurately to describe many instances of senile dementia.

"In the *second* degree of imbecility the patient still judges and acts consequently with respect to subjects that are familiar to him, but even on those subjects it often happens that he is deceived, because, through a distraction which is a second nature to him, he forgets places, times, and circumstances. He observes so little what takes place or what passes around him, that he often fancies himself in a different spot from that in which he really is, mistakes strangers for persons of his acquaintance, confounds the present with the past, but more often with the future, and believes himself at home when he is at the house of another person.

"The individual affected with imbecility in the *third* degree is unfitted for all matters which require more than a mechanical mode of action, but he preserves sufficient intelligence to be aware of his weakness and the superiority of others with respect to the mental faculties. We may likewise remark in him that propensity to devotion and to misanthropy which we have mentioned above. His mind is not completely inactive, although it cannot raise itself to any high pitch; hence he has the propensity to talk to himself. He has not the power of seizing any idea so clearly as to impress it on his mind; hence a very marked defect of memory, and a propensity to pass rapidly from one topic to another. He is very irritable and suspicious, fancies a design to insult him where it is impossible, because his state yet permits him to feel and resent injuries; of which susceptibility those around him often take advantage to his annoyance.

"The *fourth* degree of imbecility is marked by a clouded state of the understanding and the memory, with a great insensibility, which nevertheless leaves the patient a confused idea of his weakness. He eagerly seeks excitement by various stimuli.

"In the *fifth* degree of imbecility there is a nullity of intelligence; the attention cannot be directed to any object; all the faculties whose activity depends upon the intellect are destroyed or oppressed. The phenomena which depend upon attention are wanting, and those which imply its absence take their place. The imbecile in this degree is insusceptible of passions, of joy, of grief, of pleasure, in a word, of every kind of moral feeling. He is even but little sensible of pain and other physical inconveniences. He only takes nourishment because it is given to him, like an infant; the natural wants, such as hunger and thirst, have no effect upon him. He has no memory, he has neither devotion nor the desire of talking to himself, which is observed in other imbecile persons, but which implies in them to a certain degree a consciousness of their state."

The fifth stage of imbecility thus characterized by Hoffbauer, is precisely the last grade of dementia or the fatuity which is the consequence of cerebral diseases. It has been more particularly described in the article INSANITY, under the distinctive term *Amentia*, appropriated to the last stage of the disease.

"Stupidity, generally speaking, is a defect less severe than imbecility, according to the definition that we have given of both. The slightest degree, however, of imbecility indicates an imperfection of the intellectual powers less severe than the greatest degree of stupidity.

"We admit in stupidity *three* principal degrees.

"In the *first*, the individual is incapable of judging and of self-determination, only when it is necessary to weigh opposing motives. Then he feels his incapacity, and has recourse to the intelligence of others, unless pride happens to prevent him, which is often the case. If he acts absurdly, it is often because he applies to his actions a rule good in itself, but the application of which requires other considerations.

"The subject of the *second* degree of stupidity forms a judgment accurately and often promptly upon things by which he is daily surrounded; but he commits serious errors whenever it is necessary to exert a certain vigour of judgment: he embarrasses himself in any train of reasoning, however simple it may be. His memory is perhaps faithful, but it is slow; he cannot, without great difficulty, express a complex idea, if it is the result of his own reflections, and has not been received from another. When his faculties have been somewhat developed by education, he is an obstinate partisan of any thing which is, as we say, good in theory but useless in practice; because he cannot observe the circumstances which distinguish particular cases, and appreciate them according to their just value. These two conditions are, however, indispensable, in order to make with propriety the application of general rules.

"In the *highest* degree of stupidity the individual cannot go beyond one single idea; and he must completely lose that one before he can pass to another. He is hence less capable of judging than the imbecile, because the comparison of several ideas is necessary to form a judgment. Individuals who are afflicted in the third degree of stupidity often express themselves in half-uttered words, return incessantly to the same subject, make known their ideas by sentences, short, incoherent, and unfinished, like children who can retain words, but do not know how to connect them together; they express often the subject and the attribute without connecting the one to the other by the affirmative or negative. If they wish to say 'the rose is beautiful,' they will say 'rose beautiful,' or only rose, or beautiful, according as the subject or the attribute strikes them most. Often they reverse the natural order of words, and say, for example, 'rose beautiful is;' and when they perceive an omission which they wish to repair, they become still more perplexed.

"With respect to legal relations, the first degree of imbecility may be assimilated to the second degree of stupidity, and the highest degree of the latter to the third degree of the former."

M. Esquirol has made objections to the minuteness and attempted accuracy of these distinctions. He thinks it difficult, if not impossible, to determine the exact limits of each stage. The endeavour to lay down rules with accuracy scarcely attainable in practice may sometimes impose unnecessary difficulties. This is undoubtedly true, and perhaps it may be admitted that the modifica-

tions and degrees of which Hoffbauer's arrangement consists are more numerous than they ought to be. Yet the necessity of adopting some method of this kind is obvious, unless we determine to regard mental deficiency as an absolute state, and admitting of no gradations. Experience proves more and more the error of such a proceeding. The want of some rule by which the various degrees of incapacity may be measured, and the relations of each determined, has often been felt;* and M. Hoffbauer's arrangement will at least be useful as furnishing a scale to which approximations may be made in particular instances. M. Esquirol seems to suppose that Hoffbauer intended only to describe different degrees or varieties of dementia; but this appears to us to have been the case only in some instances. The first or lowest stage both of imbecility and of stupidity are clearly intended for, and strikingly characteristic of, natural weakness in some of its varieties.†

We proceed now to the practical application of these distinctions, but in this we must be satisfied with suggesting a few of the most important considerations.

"In matters of criminal accusation, all legal culpability is annulled when it is proved that the party labours under imbecility amounting to the third degree, or even nearly approaching it. Imbecility in the first and second degree may either annul or weaken culpability, or leave it unaffected under different circumstances. Ignorance of the law and of the illicit nature of actions may sometimes be alleged as excuses in criminal accusations, in the instance of imbecility amounting to the first degree. But this plea can only be allowed to be valid under one of the two following conditions: — 1st, when the law which has been violated by the imbecile neither forms part of general relations which concern himself as well as other members of society, nor belongs to his own particular habits or circumstances: 2dly, when the action forbidden by the legislator is not contrary to the law of nature.

"The second degree of imbecility may lessen or destroy culpability in cases in which the first degree leaves it entire.

"In the first degree of imbecility, inattention or absence of mind, want of foresight, &c., are not considered as excuses when they have regard to objects universally known, as to fire, or to those which are familiar in use to the imbecile, as the tools, &c. of his profession. In all other instances his fault loses the degree of culpability which belongs to it, according to the expression of jurists, *in abstracto*. This is also the case when the act is the result of sudden anger or fear, to which weak persons are prone.

"The imbecile in the second degree has less responsibility than in the first. His incapacity is greater, as likewise is his proneness to sudden emotions.

"Similar considerations affect the responsibility of persons labouring under stupidity, when it passes the middle degree above described. In fact, the latter being incapable of extending their thoughts to several objects at the same time, must omit many considerations of which intelligent persons never lose sight. Such an individual is so much the less responsible for his actions, as he is known to be incapable of the reflection which might lead another to rectify his mistakes.

"The principles established in reference to criminal law, on the ignorance of the parties, are applicable in civil law to the question — whether an individual is in a condition to recognise the illicit nature of an act by which he has trespassed on the right of another. In imbecility in the first or second degree, ignorance of the law may be pleaded as excuse under circumstances analogous to those before alluded to.

"All the arrangements which the law authorizes or prescribes in regard to imbecile persons, are founded either on their own interest or on that of others, and have for their object the personal security of either party. These arrangements refer, 1st, to the appointment of a *tutela* for the administration of the property of the weak or idiotic person, and of a *curatela* for the care of his person; 2dly, to seclusion, when it is required for preventing dangers likely to accrue to society or to the individual, from his unrestrained enjoyment of personal freedom. All the measures judged necessary for his security and for the protection of society, must be taken with as much mildness as possible.

"An imbecile person, whose affliction reaches the third degree, can no longer be judged competent to the care of his own property: this may be observed *à fortiori*, if his disorder passes that degree. But in the appointment of a tutela, regard must be had to the necessity, greater or less, of such protection, and especially to the particular character, habits, inclinations, &c. of the individual. It must be considered whether he is likely to commit actions which, though indifferent in themselves, may occasion public offence, or whether an excessive liberality or ruinous prodigality may not expose him to dissipate the property that may be left at his disposal.

"The administration of his property should be left to the imbecile in the second degree, and a curator should be appointed for him under particular circumstances, as, for example, when his character calls for such an arrangement, and when some interests are at stake which require practical intelligence, and especially constant attention. With such exception, it is unjust to deprive him of the management of his affairs. The inconveniences to which he may contingently be exposed cannot be compared with the certain annoyances connected with a tutela, and some reliance may

* Dr. Haslam has made this remark, but no attempt to furnish a scale of distinction. See Haslam on Medical Jurisprudence, as it relates to Insanity, p. 60. Any person who has attended inquests must be aware that the want of some certain rule or principle, by which both physicians and those who have to give the verdict may be assisted in forming their judgment, is often felt.

† Hoffbauer's distribution of the forms and degrees of mental weakness, which has obtained great celebrity in Germany, is highly commended by Professor Heinroth, (Störungen des Seelenlebens,) who, however, contemplates the subject in a different point of view. Heinroth suggests an additional modification, consisting in (willensschwäche) weakness of will or irresolution, and excessive timidity and fickleness of disposition; but this case can never become a matter of legal consideration. It is even questionable, as Heinroth observes, whether (dummheit) stupidity, as above defined, can ever do away entirely all moral responsibility.

be placed in general on the vigilance which self-interest calls forth even in defective minds.

"Persons imbecile in the second degree are more subject to act without reflection than those whose defect belongs to the first or the third stage. The former are rather irresolute and timid than precipitate in action, and the latter too negligent and inactive. Hence, though in the second degree imbecility does not generally authorize the appointment of a *tutela*, it often requires that individuals should be subjected to an especial *surveillance*.

"The imbecile whose infirmity does not exceed the first degree cannot justly be subjected to a tutela, or to any particular surveillance, except under circumstances in which his inclinations or habits, his family, relations, or fortune, or the affairs under his management, require such an arrangement.

"What has been observed in respect to the degrees of imbecility may be applied to stupidity, on the principle above laid down. Only it must be remembered that this last infirmity renders individuals more liable to rash and hasty actions than does imbecility.

"Imbecile persons in the third degree are evidently incapable of making wills; as their state renders them competent only to actions, which, if not unreasonable, are without reflection. The case is not so in the instance of imbeciles in the first and second degree, even though under certain circumstances, before adverted to, they may occasionally be subjected to a surveillance or even to a *curatela*. The object of this curatela is to protect them from injuries which they might bring upon themselves if left to their own discretion, and to prevent engagements which they might contract and be unable to fulfil. These considerations are not, however, reasons for depriving them of the power of making a will. By a testament they might deprive those who would inherit *ab intestato*, but they prejudice no formal right. Besides, a testament does not require the same intelligence as the administration of property: it only depends upon a single arrangement, for which the testator has sufficient time for deliberation."

To this last opinion of M. Hoffbauer, it is objected by M. Chambeyron, that by the simple appointment of a tutela the imbecile person is assimilated to a minor, and declared incapable of any civil act, except under some particular circumstances, and when the authentic consent of the tutor may authorize him to contract. Why then, it is inquired, should there be any exception for the right of testating? The author has given a satisfactory reason why this right should be preserved inviolate in certain instances, namely, that individuals may and do retain the requisite degree of intelligence for entering into the arrangements in question, though in other respects in a state which renders the appointment of a guardian, or some especial *surveillance*, advisable. The incongruity pointed out by M. Chambeyron has respect to positive institutions, and the observation of M. Hoffbauer is founded on general principles.

We shall here terminate the consideration of mental weakness or defect, and now proceed to the second division of our subject, namely, Diseases of the Mind,—a term which we adopt for the sake of convenience, though, on the ground of strict propriety, objectionable.

II. Diseases of the Mind considered in relation to Jurisprudence.

1. Of Intellectual Derangement or Mental Illusion.—*Monomania and Mania.*—Professor Hoffbauer adopted an ingenious, though erroneous, idea as to the nature of these diseases. On this he has founded some practical conclusions, of which the validity is very doubtful; they deserve, however, for reasons which will appear, a few moments' consideration. Mental illusion (wahnsinn) consists, according to him, in a loss of that due proportion which, in the sound state of the mind, the powers of sense and perception bear to the influence of imagination. The influence of imagination may become excessive in two ways; first, by increased intensity or exaltation of this faculty, the other powers remaining the same; or, secondly, by depression of the latter, while the faculty of imagination remains unchanged. The former is monomania, in which, as the author supposes, the mind is not destroyed or generally affected. The latter is mania, and in this the powers of the understanding, perception, apprehension, are greatly impaired.

No practical error is likely to arise from this opinion, as far as it respects the nature of mania. Persons who are generally deranged or raving mad, cannot be supposed by any one to be accountable for their conduct, or capable of managing their affairs. No dispute exists among jurists or physicians on this subject. The state of maniacs is, in general, too manifest to admit of any doubt. The lunatic perceives the objects and persons who surround him, but his imagination transforms them, and they are mistaken by him as to their nature and identity. "Hence in civil law the acts of such an individual manifestly lose all their consequences, and can neither convey any right to another, nor place the agent himself under obligation. In criminal law he is discharged from all responsibility, and consequently from all culpability; since what he wills to do in his imaginary situation is not what he would do in his real situation, were he only aware of the latter. This state of disease fully justifies the placing an individual under a tutela, and the disposing of his person in that way which shall appear most conducive to his recovery, or, in hopeless cases, to his security and comfort."

It will be apparent to those who entertain a correct opinion as to the nature of monomania, or partial derangement of the understanding, that a great part of this reasoning applies almost equally to persons affected by that form of disease. But here we find Professor Hoffbauer's theory leading him into error, an error which is not peculiar to him. As his opinion is common to many, and the inference to which it has led him is by no means a matter of indifference, we shall cite some of his observations, and presently add the comments of a practical physician, the powers of whose acute and penetrating mind have been directed to this subject.

Hoffbauer supposes that, in partial insanity characterized by hallucinations, the representation

of unreal objects, or the illusory transformations of existing ones, such illusions can only pervert the judgment when the affected train of ideas is brought into play; and that on matters unconnected with this illusion, the individual is to be considered as a sane man. "In this relation, therefore, insanity cannot be recognised by the law. In civil law all the acts of the party preserve their validity, and in criminal law their culpability." In fact, there is no reason why a man who thinks he has legs of glass, and in other respects is in possession of all his faculties, should not be capable of contracts, and responsible for illegal acts which have no connection with the subject of his madness. Such a species of insanity seldom prevents a man from managing his own affairs, or undertaking any legal relations for others. Swedenborg, so celebrated by his visions, who was confessedly a madman, fulfilled the duties of his office in so distinguished a manner, that the king of Sweden ennobled him. The author knew a doctor in laws who had taken it into his head that all the freemasons had entered into a league against him. This person, who in other respects was perfectly sane, held with high credit a chair in an university.

In general, in relation to the insane, the ruling idea or illusive opinion characteristic of their disease, considered with respect to the imputability of their actions, ought not to be regarded as an error, but as a truth; or, in other words, their actions ought to be considered as if they had been committed under the circumstances in which the patient believed himself to be. At Brieg a soldier killed a child because he thought he saw the Deity near him commanding him to do it. Dr. Glanwitz, in his report, came to the conclusion that the man should be confined in a lunatic asylum.

"When the question relates to consent to some particular matter, regard must be had to the prevailing idea, inasmuch as upon its truth or falsity depends the reality of the consent. If, for example, in a civil affair, as a contract, we suppose that the contractor would not have given his consent without a previously existing illusion, this idea is looked upon as an error, not imputable to the person concerned. As to the question, whether the results of the act are cancelled or not, this must depend upon what the laws have decided with respect to involuntary errors.

"In practice, it is difficult to decide whether an affair undertaken by a person labouring under madness, with a fixed illusion, is valid or not, on account of the errors likely to result from this fixed illusion. For as long as this person enjoys his rights, it is not the business of another to examine if his act is valid or not. And besides, the person himself neither could nor would acknowledge his error."

From what has preceded, we apprehend how important it is to determine, in cases of permanent illusion, the paramount idea; to know whether it brings on a derangement, more or less complete, of the intellectual faculties; or only prevents the perfect use of the judgment in relation to certain objects; to discover what influence it has, on one side, upon the notion which the patient has of himself and of his relations with his equals, and, on the other, upon his actions in general. When the prevailing error draws with it a total incoherence of ideas, the case approaches to one of imbecility.

"When a patient attacked by madness, with one fixed illusion, has a false notion of himself and of his relations to others, this circumstance ought to be taken into consideration. For in criminal justice actions ought to be regarded as if the person really was in the state and in the circumstances in which he believed himself to be. Thus the crimes committed by madmen fancying themselves kings and princes, ought not to be punished according to their nature and heinousness; the culpability is lessened or destroyed.

"We ought, above all, to have regard to the illusion under which the patient is carried, by his paramount idea, to commit actions which he considers as matters of duty. In religious madness, for example, the acts which a person afflicted with this form of the disease commits, ought still less to be punished; because no kind of human suffering could have any effect upon a lunatic of this description; divine punishment, or the hope of eternal reward, weighs much more strongly upon his mind than the fear of anything within the power of man."

Similar opinions have been advanced in a manner less restricted, by a high legal authority in France. The following observations are understood to convey the sentiments of the advocate-general, M. de Peyronnet, as they were delivered in a process on the "Affaire de Papavoine:"* "The advocate-general," says the report, "proceeds to examine whether every kind of insanity ought to absolve from culpability, and after distinguishing, in the clearest manner, partial from total derangement, sustains and demonstrates that the last can alone extricate a criminal from the penalty of the laws. This reasonable distinction, thus laid down by the public authority, throws the strongest light upon the questions of mental alienation, the most intricate question in medical jurisprudence, which some physiologists have solved in a manner as unfavourable to accusation as injurious to morality, and alarming to society. M. de Peyronnet here cites some passages from Lord Hale. Of these we should prefer to cite the English text, but as the advocate-general has given to some of the expressions a more definite turn, in a manner which displays fully his own way of thinking, we shall crave permission to deviate from our usual course, and cite the exact words of M. de Peyronnet:

"'Il est une démence partiélle et une démence totale: la première est relative à tels ou tels objets. Quelques personnes qui jouissent de leur raison pour certaines choses sont sujettes à des accès d'uné démence spéciale, à tels discours ou tels sujete, où bien elle est en particlle dans ses degrès; telle est la condition d'une foule d'insensés; et surtout des personnes mélancoliques dont la folie consiste la plupart du temps à témoigner des craintes, des chagrins excessifs, et qui cependant ne sont pas entièrement privées de l'usage de la raison. Cette démence partielle *semble ne pas*

* Discussion Médico-légale sur la Folie, &c. par le Docteur Georget. Paris, 1826. See, also, Examen Médical des Procès criminels des nommés Léger, Feldtman, Lecouffee, Jean-Pierre, et Pavoine, &c., par le Dr. Georget. Paris, 1825.

excuser les crimes que commettent ceux qui en sont atteints, *même en ce qui en fait l'objet principal;* car toute personne qui s'arme contre lui-même ou contre d'autres, est jusqu' à un certain point dans un état de démence partielle lorsqu'elle se rend coupable.....Je suis en outre forcé d'admettre qu'il est une importante distinction entre les cas civils et les cas criminels. Dans les premiers, dès qu'il est prouvé que la raison de l'homme est altérée, la loi annulle ces actes, *quoiqu'ils n'aient aucune relation avec les circonstances qui causent sa démence, et qui auraient pu influér sur sa conduite. Mais lorsqu'il s'agit de décharger un homme de la responsibilité de ses crimes, et surtout de crimes atroces, on ne peut point réclamer l'application de cette règle, incontestable pour une question de propriété.*'

"After having laid down principles so precise, so positive, so satisfactory to the jury," continues the reporter, "the advocate-general applies them to the cause." The same writer cites further the following passage, which leaves no doubt as to the views of M. de Peyronnet: "The pretended insanity of the accused is a pretext had recourse to in despair of the cause: certain it is that this derangement cannot have been total; it is likewise proved that it could not be partial, and in this last supposition, if even allowed, *it could not serve for an admissible excuse.*"

M. Georget, possessing much more correct knowledge of the real nature of monomania, or partial illusion, considered the joint opinion of these lawyers as highly objectionable. He expressed his astonishment at the sentiments of Lord Hale. "This writer," he says, "appears professedly to consider property of higher value than human life! There is then no excuse for an unfortunate lunatic, who in a paroxysm commits a reprehensible action, even although it should appear to be the result of his particular illusion! And yet the civil acts of this same individual are to be annulled, although they have no relation to the insane impressions which might have influenced his conduct! And even M. de Peyronnet could cite such maxims as these with approbation; we do not at least find he has objected to any part of them. All monomaniacs, according to this statement, are liable to become criminals in spite of the sixty-fourth article of our penal code, and may undergo the penalties recorded for atrocious offences."

M. Georget has refuted these opinions on grounds which must be conceded by the jurists of all countries, viz. on those of experience and correct knowledge as to the real state of monomaniacs. Such persons, as he has clearly proved, though they reason correctly on a variety of subjects remote from the particular one on which their illusion turns, are yet more fully deranged than they appear to be, and are even liable to display perversities both in feeling and action. Cases like those of Swedenborg and the German professor mentioned by Hoffbauer, very rarely occur. Even in these instances, had we been enabled to follow the individuals affected into private life and to observe their personal deportment, it is almost certain that something would have been discoverable in their moral character and habits different from those of ordinary men. M. Georget's observations have led him to form nearly the same opinion as to the nature of monomania or partial derangement as that which we have expressed in a former part of this work. (See INSANITY.)

The facts of a remarkable case of this description which came out in evidence some years ago before an English court, confirm in a striking manner the character here ascribed to this disease. For a full account of this we must refer to a "Report of the judgment in Dew vers. Clarke and Clark, delivered by the Rt. Hon. Sir John Nicholl in the Prerogative Court of Canterbury. In this it was proved that the individual "in the ordinary transactions of life conducted himself and his affairs rationally; was a sensible, clever man; amassed a considerable fortune by his profession; took good care of his property; and that several of his friends and acquaintance, some of them medical persons, never even suspected that he was deranged in mind." It was stated by those who wished to prove his sanity, that "he was a man of irritable and violent temper, of great pride and conceit, very precise in all domestic arrangements, very impatient of contradiction, entertaining high notions of parental authority, rigid notions of the total and absolute depravity of human nature, of the necessity of sensible conversion, and of the necessity or expediency of confessing to other persons the most secret thoughts of the heart." It was proved that this person, such as he is above described, having a daughter "amiable in disposition, of superior talents, patient under affliction, dutiful and affectionate, modest and virtuous, moral and religious," was in the habit of "tying this daughter to a bed-post, flogging her with the most unmerciful severity, aggravating her sufferings by the application of brine, flogging her repeatedly with a horsewhip, pulling her hair out by the roots, and compelling her to perform the meanest drudgery." It is scarcely necessary to add that the able and enlightened judge before whom the investigation of this case was brought, declared the individual to be "non compos mentis."

If such is in general the real character of partial insanity, and if in cases which come near to the idea usually entertained of this disease, are (when and if they occur) rare exceptions to the general fact, it will be allowed that criminality should be attached with extreme caution to any individual in whose case the existence of insane illusion has been proved, however limited in its extent this particular phenomenon of the disease may appear to be. The same consideration ought to weigh in an equal degree in questions which respect the exercise of personal rights.

The only remaining topic connected with illusion which we shall at present consider, is the subject of *lucid intervals.*

Hoffbauer has well observed that much depends upon the duration of lucid intervals. In some instances these intervals are very short; in others they are of equal length with the periods of disease, and sometimes they last much longer than these periods. In the former case the individual has consciousness of his actual state with relation to external circumstances, but not with relation to his former periods of existence. His life is only, in his view, in insulated fragments; his knowledge of himself is inaccurate and confused. This

observation can only be applied in a more limited manner to cases in which lucid intervals are nearly of equal duration to the periods of disease. We cannot follow M. Hoffbauer into the inferences which he founds upon this observation.

We must likewise take into consideration the circumstance that repeated attacks of disease weaken the understanding, and that, when they are frequently recurrent, the individual generally falls into a state bordering on dementia, in which the remembrance of persons and relations becomes very defective. In such instances it must become a subject of inquiry to what form and degree of MENTAL DEFICIENCY, as before distinguished, his particular case belongs.

In all examinations respecting insane illusions, it will be necessary to bear in mind the well-known fact, that many lunatics display great artifice in evading questions relating to their morbid impressions, even while these impressions are strongly fixed in their minds. Hoffbauer is incorrect in attributing this dissimulation to the supposed fact, that the lunatic during a lucid interval has perceived his hallucination to be absurd. We know that such dissimulation and evasion have been practised in cases in which no lucid intervals have occurred, especially when the lunatic has been frequently interrogated upon the subject of his erroneous convictions. A striking fact, exemplifying this observation, is mentioned by M. Chambeyron.

The statement of what the English law has positively determined with reference to insanity comes within a comparatively short compass. *Lunacy*, when proved to exist, absolves from guilt in criminal cases. "For," as it is observed by Sir Edward Coke, "the execution of an offender is for example, 'ut pœna ad paucos, metus ad omnes perveniat;' but so it is not when a madman is executed; but should be a miserable spectacle, both against law and of extreme inhumanity and cruelty, and can be no example to others. But if there be any doubt whether the party be *compos* or not, this shall be tried by a jury. And if he be so found, a total idiocy or absolute insanity excuses from the guilt, and of course from the punishment of any criminal action committed under such deprivation of the senses: but if a lunatic hath lucid intervals of understanding, he shall answer for what he does in those intervals, as if he had no deficiency. Yet, in the case of absolute madness, as they are not answerable for their actions, they should not be permitted the liberty of acting, unless under proper control; and in particular they ought not to be suffered to go loose to the terror of the king's subjects." (Blackstone, book iv. c. 2 and 3.) The question is, what will be considered as *lunacy*. In the penal code of France, it seems, from M. Georget's statement, that partial insanity is a sufficient plea against responsibility for offences: this we rest upon the sixty-fourth article. It would appear, however, from the passages cited above from Lord Hale, (which, however, the reader ought to compare with the original text of that lawyer,) that partial insanity is not considered in English law as entirely cancelling responsibility for actions, or consequently culpability, or what the Germans more correctly term (*strafbarkeit*) punishability.

It is observed by Professor Hoffbauer, that in cases of partial illusion it is extremely difficult to ascertain how far the influence of the insane error extends, and what trains of thought and acts of the understanding are within or without the limits of its sphere. If this be borne in mind, and it be also fully made known to juries that monomania generally involves a morbid perversion, and sometimes occasions a total change of the moral character of the individual affected, the cases of punishable criminality occurring under circumstances of mental disease will probably be reduced to a very small proportion.

The exercise of civil rights is suspended when a lunatic is proved to be such: he is neither capable of entering into marriage, nor of any other contracts. These disqualifications, however, only subsist during actual derangement: in a lucid interval a lunatic resumes the exercise of personal rights.

The chancellor, on receiving information as to the state of a deranged person, issues a writ "de lunatico inquirendo," and on lunacy being established by the verdict of a jury, appoints committees to take care of the individual as to his person, and to administer his estate.*

2. Of Moral Insanity, in its relation to criminal and civil law.—In the essay on insanity contained in a former volume of this Cyclopædia, we described a form of mental derangement, under the title of moral insanity, consisting in disorder of the moral affections and propensities, without any symptom of illusion or error impressed on the understanding. The question whether such an affection really exists or not is very important in connection with medical jurisprudence, and we find it to be an indispensable duty here to enter upon it and consider it under this relation.

We must first observe that no such disorder has been recognised in the English courts of judicature, or even in general admitted by medical writers in England. By them it has been laid down that insanity consists in, and is co-extensive with, mental illusion. English writers in general admit only that form of insanity which the Germans term *wahnsinn;* they know nothing of moral insanity either as requiring control in the exercise of civil rights, or as destroying or lessening culpability in criminal ones. Thus in a report of judgment issued not many years since by one of the most distinguished lawyers in this country, it is laid down that "insanity is deluded imagination, the substitution of fancies for realities." In the same report we find the following remarks:—

"As far as my own observation and experience can direct me, aided by opinions and statements I have heard expressed in society, guided also by what has occurred in these and in other courts of justice, or has been laid down by medical and legal writers, the true criterion is—where there is delusion of mind there is insanity; that is, when persons believe things to exist which exist only,

* For further particulars as to the modes of proceeding respecting lunatics, see the Appendix to Dr. Cox's work on Insanity, and Paris and Fonblanque's Medical Jurisprudence, vol. i. p. 289 & seq.; also Blackstone, book i. c. 8, s. 18. Item, c. 15, 4. Book ii. c. 19, 1. Book iii. c. 27. Book iv. c. 2, 2.

or at least in that degree exist only in their own imagination, and of the non-existence of which neither argument nor proof can convince them, they are of unsound mind; or, as one of the counsel accurately expressed it, 'it is only the belief of facts which no rational person would have believed, that is insane delusion.' This delusion may sometimes exist on one or two particular subjects, though generally there are other concomitant circumstances, such as eccentricity, irritability, violence, suspicion, exaggeration, inconsistency, and other marks and symptoms which may tend to confirm the existence of delusion, and to establish its insane character."*

The right honourable and learned judge afterwards cites some authorities, both medical and legal, in support of his opinion. The former are principally the sentiments of Dr. Battie and Dr. F. Willis. Dr. Battie says that "deluded imagination is not only an indispensable, but an essential feature of madness."

Dr. F. Willis, in his treatise on mental derangement, which was the substance of the Gulstonian Lecture delivered before the College of Physicians in 1822, thus points out the difference, according to his apprehension, between an unsound and a sound mind:—

"A sound mind is one wholly free from delusion. Weak minds, again, only differ from strong ones in the extent and power of their faculties; but unless they betray symptoms of delusion, their soundness cannot be questioned." "The man of insane mind from disease, having been once compos mentis, pertinaciously adheres to some delusive idea, in opposition to the plainest evidence of its falsity, and endeavours by the most ingenious arguments, however fallacious they may be, to support his opinion."

Lord Coke and Lord Hale are referred to for a similar opinion.

It seems, then, to have been the prevalent judgment both of medical and legal writers in this country, that *delusion* constitutes the essential character of insanity; and hence, unless the existence of this characteristic phenomenon should be proved, it would probably be very difficult to maintain a plea on the ground of insanity in this country, with a view to the removing culpability in a criminal accusation.

We have now to call the attention of our readers to facts and to the opinions of practical men, established upon the ground of experience, which authorize a very different conclusion.

In the first place, we shall take the liberty of referring to the article INSANITY in this work, in which a select number of cases has been given in a brief and condensed statement, and the opinions of some practical writers have been cited, particularly those of MM. Pinel, Esquirol, and Georget.

The German writers, Hoffbauer, Reil, and Heinroth, admit more or less distinctly the existence of moral insanity, or of a mental disease consisting exclusively in undue and morbid excitement of the passions and feelings. In this they appear in part to have been influenced by the opinion of Pinel. Neither Pinel, however, nor the German writers above-named, have assigned to moral insanity so general a description as the truth warrants, nor have they referred to it all the different forms which really belong to it. *Reine tollheit* and *reine melancholie*, simple madness of excitement and simple melancholy, are indeed brought under one category by Heinroth, but with an imperfect conception of their relations. (Störungen des Seelenlebens, th. 2. Formenlehre.)

Hoffbauer defines *tollheit* to be a state in which reason has lost her empire over the passions and the actions by which they are manifested, to such a degree that the individual can neither repress the former nor abstain from the latter; it does not hence result, as he observes, that the person affected may not be in possession of his senses, and even of his usual degree of intelligence.

Hoffbauer points out many varieties of *tollheit*. One of these consists in general excitement and want of the power of self-government. "The individual," he observes, "abandons himself without restraint to the indulgence of all his appetites and passions in the most shameless and unrestrained manner, without regard to decency or propriety."

The writers, then, whom we have cited, admit the existence of a form of madness consisting in excessive excitement of passions, though they have not recognised moral insanity under so general a character as we have ascribed to it. A similar observation applies to MM. Pinel and Esquirol. The former, indeed, adopts the term of *manie sans délire;* he says that persons labouring under this form of disease display at no period any lesion of the understanding, but are governed by a sort of instinctive madness (instinct de fureur), as if the affections alone had sustained injury from the morbid cause—"comme si les facultés affectives seules avoient été lésées." (Traité Médico-Philosophique sur l'aliénation mentale, par Ph. Pinel, sec. edit. Paris, 1809.) These expressions set forth exactly the idea which we have endeavoured to convey, but we wish to render the observation general, and M. Pinel's cases are all instances of persons who were subject to violent attacks of anger or fury. We may, however, perceive that the writers above-named admit as matter of fact the existence of a variety of mental diseases, consisting in disturbance of the active and moral powers. We shall now collect from them and others a few striking examples.

The following instances were published by M. Marc, and have already been cited by more than one continental writer. The facts display, as the author observes, a struggle in the mind of the individual between the instinctive desire which constitutes the whole manifestation of disease, and the judgment of the understanding still unaffected and struggling against it. (Consultation Médico-légale pour H. Cornier, femme Berton, accusée d'homicide, par M. Marc, &c. Chez Roux.)

"In a respectable house in Germany, the mother of the family returning home one day, met a servant, against whom she had no cause of complaint, in the greatest agitation; she begged to speak with her mistress alone, threw herself upon her knees, and entreated that she might be sent out of the house. Her mistress, astonished, inquired the reason, and learned that whenever this

* Report of the judgment in Dew v. Clarke and Clarke, delivered by the Right Hon. Sir J. Nicholl. Lond. 1826.

unhappy servant undressed the little child which she nursed, she was struck with the whiteness of its skin, and experienced the most irresistible desire to tear it in pieces. She felt afraid that she could not resist the desire, and preferred to leave the house." "This circumstance occurred about twenty years ago in the family of M. le Baron de Humboldt, and this illustrious person permitted me to add his testimony."

"A young lady," continues M. Marc, "whom I examined in one of the asylums of the capital, experienced a violent inclination to commit homicide, for which she could not assign any motive. She was rational on every subject, and whenever she felt the approach of this dreadful propensity, she entreated to have the strait-waistcoat put on, and to be carefully guarded until the paroxysm, which sometimes lasted several days, had passed."

"Mr. R., a distinguished chymist and a poet, of a disposition naturally mild and sociable, committed himself a prisoner in one of the asylums of the Fauxbourg St. Antoine." "Tormented by the desire of killing, he often prostrated himself at the foot of the altar, and implored the divine assistance to deliver him from such an atrocious propensity, and of the origin of which he could never render an account. When the patient felt that his will was likely to yield to the violence of this inclination, he hastened to the head of the establishment, and requested to have his thumbs tied together with a ribbon. This slight ligature was sufficient to calm the unhappy R., who, however, finished by endeavouring to commit homicide upon one of his friends, and perished in a violent fit of maniacal fury."

"A servant-maid, twenty-six or twenty-eight years of age, whose menstruation was perfectly natural in every respect, nevertheless experienced at each period a sort of excitement which did not apparently affect her judgment, but which rendered her extremely dangerous, since, without provocation, she menaced every person with her knife, and one day having realized her menaces, she was sent to a lunatic hospital."

Plattner and Etmuller have related several instances of homicidal melancholy, but observe that it consists in mental disorder involving no lesion of the reasoning power or understanding.

The following case, reported by Metzger, has been already cited by several authors. M. Hoffbauer has observed that *it is not a case of delusion; that the individual concerned did not labour under any erroneous idea* impressed upon his understanding, but was only not master of his actions. He was under the influence of excessive pride and impetuosity of feeling.

A Russian colonel came to Königsberg to receive an inheritance, and committed there so many acts of violence, that he was summoned before the tribunal of justice. His conduct before the magistrates was equally unreasonable. He had become so much an object of dread at Königsberg, that nobody would execute any commission for him—the very chimney-sweepers required a guard if sent to sweep his chimneys. At last, after several complaints made against him, he was arrested because he had threatened to stab his landlord with a pitchfork for demanding his rent, and had pursued him with that intent. "In going into the prison, I saw," says Metzger, "an old man with white hair, of a respectable appearance, who received me politely. I inquired first concerning his health. 'I am ill through old age,' he replied, 'and tormented with gout, with the stone, and with the scurvy, evils for which I can have no remedy.' He desired to know who had sent me to see him; I told him it was the tribunal. 'I ought to be judged,' he replied, 'by a French tribunal;' and he pretended that I should find proof of what he said in a writing which he forced me to take. At last I informed him of the reason of his arrest. His eyes then became sparkling, and he said in French, with much volubility, that MM. ——— and ——— were his mortal enemies; that they had several times tried to ruin him; that he had experienced much injustice and oppression on the part of the tribunal; and that they had disposed according to their own will of the inheritance of his brother. Being asked what were his occupations, he replied, 'that he was, as every honest man ought to be, free and content, even in prison; that he amused himself with poetry, and copied verses relating to his real situation.'" The following are the conclusions of Metzger: "Although Colonel L. appears to judge and act rationally in every thing beyond the circle of his false impressions (he should rather have said disordered feelings), yet it is clear, from his conversation, conduct and actions, that pride, passion and suspicion have produced a degree of insanity, which renders him dangerous to society, and makes his confinement necessary."

Reil has given the details of a case which has been cited by Professor Heinroth. (Störungen des Seelenlebens, th. 2. Formenlehre, s. 216.) A countryman, who was in the habit of throwing stones at every person whom he could assail, was at length on this very account taken up and confined in a madhouse. There he behaved with the utmost propriety, gave no indication of disordered mind, of delusion, or violence, and became so active and diligent in his employment, that he was supposed to be perfectly sane, and was dismissed from confinement. On the evening after his return home, as soon as his neighbours, who came to welcome him, had withdrawn, he shut himself up in his house with his wife and children, and murdered them all.

The following instances of propensity to infanticide are given by Dr. Michu. In both cases the individuals were afflicted by the consciousness of their state, confessed it, and recovered without any sinister event.

"A countrywoman, twenty-four years of age, of a bilious sanguine temperament, of simple and regular habits, but reserved and sullen manners, had been ten days confined with her first child, when suddenly, having her eyes fixed upon it, she was seized with the desire of strangling it. This idea made her shudder; she carried the infant to its cradle, and went out in order to get rid of so horrid a thought. The cries of the little being, who required nourishment, recalled her to the house; she experienced still more strongly the impulse to destroy it. She hastened away again

haunted by the dread of committing a crime of which she had such horror; she raised her eyes to heaven, and went into a church to pray.

"This unhappy mother passed the whole day in a constant struggle between the desire of taking away the life of her infant, and the dread of yielding to the impulse. She concealed, until the evening, her agitations; then her confessor, a respectable old man, was the first who received her confidence, who, having talked to her in a soothing manner, advised her to have recourse to medical assistance.

"When we arrived at the patient's house, she appeared gloomy and low, and felt ashamed of her situation. Being reminded of the tenderness due from a mother to her child, she replied, 'I know how much a mother ought to love her child; but if I do not love mine, it does not depend upon me.'

"At Bures, the wife of a butcher, forty years of age, of a nervous constitution, the mother of several children, of a mild amiable character, endowed with good sense, who had always enjoyed good health, experienced anxiety of mind in consequence of the derangement of her affairs, of which her husband was a chief cause.

"One night she had a dream, and thought she perceived a cord, which she tried to seize in order to hang herself. On awaking, she was silent, and had confused ideas which soon fixed themselves in a project of strangling her children. She mentioned to her husband, shedding tears, this dreadful design, and requested that her children and even the knives belonging to the trade might be put out of her way."

M. Esquirol has repeatedly declared his conviction that there exists a species of homicidal madness, in which "*no disorder of intellect can be discovered;*" the murderer is driven, as it were, by an irresistible power; he is under an influence which he cannot overcome, a blind impulse without reason: it is impossible to divine the motive which induces him, without interest or disorder of intellect, to commit acts so atrocious and so contrary to the laws of nature.

The same writer observes that physical or moral causes which can be assigned, often give rise to this disordered state.

"In two cases this affection resulted from the change produced by puberty; in four the propensity manifested itself after the individual had heard the history of a woman who had strangled her infant and separated its head from its body. This principle of imitation is one frequent cause of madness. 'Some individuals,' said M. Delaplace, 'possess, from their organization or from bad example, fatal propensities, which are excited by the description of a criminal action, when it has become the object of public attention. Under this idea the publicity of crimes is not without danger.'

"When the affection has continued for some time, and the individuals possessed with the desire of committing murder have been observed, we have seen that this state is, like the delirium of lunatics, preceded and accompanied by headach, and pains in the stomach and bowels; these symptoms have preceded the impulse to murder, and have become more severe when this dreadful propensity is exasperated." (*Esquirol*, sur la Monomanie Homicide.)

In the following case the co-existence of physical disease could be distinctly traced.

"A peasant, born at Krumbach in Swabia, and of parents who had not very robust health, twenty-seven years old and unmarried, was subject, from nine years of age, to frequent fits of epilepsy. Two years ago his disease changed its character without any apparent cause; instead of a fit of epilepsy, this man found himself from that time attacked with an irresistible desire to commit murder. He felt the approach of this attack sometimes many hours, sometimes a whole day before it seized him. From the moment in which he felt this presentiment, he desired, with earnestness, that he might be tied down, that he might be loaded with chains, to prevent his committing a horrid crime. 'When the fit takes me,' he said, 'I am impelled to kill or strangle even an infant.' His father and mother, to whom he was tenderly attached, would be the first victims of this murderous propensity. 'My mother,' he cries out, with a fearful voice, "save yourself, or I shall be obliged to murder you!'"

The following case was published by Pinel, and affords the most striking example of this "instinctive fury." It likewise furnishes an instance of the homicidal propensity evidently connected with physical disease.

"A man who had previously followed a mechanical occupation, but was afterwards confined at Bicêtre, experienced, *at regular intervals*, fits of rage, ushered in by the following symptoms. At first he experienced a sensation of burning heat in the bowels, with an intense thirst and obstinate constipation. This sense of heat spread by degrees over the breast, neck, and face, with a bright colour; sometimes it became still more intense, and produced violent and frequent pulsations in the arteries of those parts, as if they were going to burst: at last the nervous affection reached the brain, and then the patient was seized with a most irresistible sanguinary propensity; and if he could lay hold of any sharp instrument, he was ready to sacrifice the first person that came in his way. In other respects, he enjoyed the free exercise of his reason; even during these fits, he replied directly to questions put to him, and showed no kind of incoherence in his ideas, no sign of delirium; he even deeply felt all the horror of his situation, and was often penetrated with remorse, as if he was responsible for this mad propensity. Before his confinement at Bicêtre, a fit of madness seized him in his own house: he immediately warned his wife of it, to whom he was much attached; and he had only time to cry out to her to run away, lest he should put her to a violent death. At Bicêtre, there appeared the same fits of periodical fury, the same mechanical propensity to commit atrocious actions, directed very often against the inspector, whose mildness and compassion he was continually praising. This internal combat between a sane reason in opposition to sanguinary cruelty, reduced him to the brink of despair, and he has often endeavoured to terminate by death this insupportable struggle. One day he contrived to get possession of the cutting-knife of the shoemaker of the hospital, and inflicted a severe wound upon himself in the right side of his chest and arm, which was followed by

a violent hemorrhage. Strict seclusion and a strait-waistcoat restrained his suicidal purposes." (*Pinel*, Traité sur l'Aliénation.)

The influence of imitation or sympathy in exciting this strange propensity is illustrated by the results of Henriette Cornier's trial. This was a very remarkable case of infanticide, which underwent much discussion, and became the subject of very general conversation in France. Many females of respectable classes, who were strongly impressed by the relation, and the horror occasioned by it, were seized with a similar propensity. M. Esquirol has detailed the circumstances attending several of these cases, on which he was privately consulted. The facts of Henriette Cornier's history, which is one of the most striking examples of the kind on record, are so remarkable that we shall not consider our comments on this subject to be complete without inserting a brief abstract of them.

Henriette Cornier, femme Berton, aged twenty-seven years, domestic servant, was of mild and lively disposition, always full of gaiety and vivacity, and remarkably fond of children. In the month of June, 1825, a singular change was observed in her character: she became silent, melancholy, absorbed in reverie, and was soon dismissed from her service. She fell gradually into a permanent stupor. Her friends were alarmed, suspected that she was pregnant, but were mistaken: they could never obtain from her any account of the cause of her dejection, though she was frequently interrogated. In the month of September she made an attempt to drown herself in the Seine, but was prevented.

In the following October, the relatives of H. Cornier procured her another employment at the house of Dame Fournier. The change of condition made no abatement in her dejection and profound melancholy.

On the 4th of November, the conduct of Henriette Cornier not having been previously in any way different from her usual behaviour, she suddenly conceived and immediately executed the act for which she was committed.

About noon, Dame Fournier went from home, and told H. Cornier to prepare dinner, and to go to a neighbouring shop, kept by Dame Belon, to buy some cheese. Henriette had frequently gone to this shop, and had always caressed a beautiful little girl, nineteen months old, the child of Belon. On this day she went to the shop and displayed the greatest fondness for the little girl, and persuaded Dame Belon, who was at first rather unwilling, to let her take it out for a walk. H. Cornier immediately took the child with her to the house of Dame Fournier, then empty, mounted the common staircase with a large knife which she took from the kitchen, and stretching the child across her own bed, with one stroke cut off its head. The head, which she held in her hand, she placed by the casement and then put the body on the floor near to it. All these proceedings occupied about a quarter of an hour; during this time Henriette Cornier remained perfectly calm; she experienced no emotion of any kind. Dame Belon presently came to seek for her child, and called Henriette from the bottom of the stairs. 'What do you want?' said the latter, advancing on the corridor. 'I come to seek my child,' said Belon, ascending the stairs. 'Your child is dead!' replied Henriette, with perfect coolness. Belon, alarmed, became more earnest; and Henriette again pronounced the words, 'Il est mort, vôtre enfant!' As Belon forced her way into the room, Henriette took the child's head from the casement and threw it, by the open window, into the street. The mother rushed out of the house, struck with horror. An alarm was raised; the father of the child and officers of justice, with a crowd of persons, entered. Henriette was found sitting on a chair near the body of the child, gazing at it, with the bloody knife by her, her hands and clothes covered with blood. She made no attempt for a moment to deny the crime; confessed all the circumstances, even her premeditated design and the perfidy of her caresses, which had persuaded the unhappy mother to entrust to her the child. It was found impossible to excite in her the slightest emotion of remorse or grief; to all that was said she replied, with indifference, 'J'ai voulu le tuer!' 'I intended to kill the child!'

When Henriette Cornier was brought to trial, a plea of insanity was set up. MM. Adelon, Esquirol, and Léveillé were appointed to visit her and report on the 'actual moral state of the accused.' After several visits, these distinguished physicians declared that they could discover no proof of insanity, yet they were not decided as to the non-existence of such disease. The affair was put off; Henriette Cornier was taken to the Salpétrière. There she was inspected repeatedly by the physicians, whose last report concludes that, "from February 25 to June 3, they had observed in Henriette Cornier merely a dejection of mind, slowness in the manifestation of thought, and profound grief; 2dly, that these phenomena are explained by circumstances, and therefore no proofs of derangement; 3dly, that the opinion as to the question of her sanity is materially affected by facts relating to her previous history. If the allegation is proved that, long previously to the committal, her habits, her whole character, had become changed; that she had become at a particular period dejected, gloomy, taciturn, restless, prone to reverie, and had occasionally attempted suicide, it would seem that her present state is not the result of existing circumstances, since it had lasted a year before the commission of the act, in which case the opinion as to her sanity would be materially influenced."

At the renewal of the trial of Henriette, M. Esquirol and several other physicians were examined. The opinions of the physicians leaned generally towards the real existence of derangement. The advocate-general treated the existence of monomania as a mere figment invented by medical persons for the sake of paralyzing the hands of justice. In the end, the jury brought in a verdict that Henriette Cornier had committed homicide voluntarily, but without premeditation, and she was condemned to perpetual imprisonment, with forced labour, and to be branded with the letters T. P., which sentence she heard without betraying the slightest emotion. It is observed by M. Georget that the judges on this trial evinced reluctance to suffer a clear investigation by physicians of the actual mental state of the accused,

and in other respects exerted an unusual influence towards the condemnation. The public sentiment appears to have been against that of the physicians, and M. Georget was treated with ridicule by the journalists of Paris. Yet it is impossible for any person of sound judgment to read the account of this trial, which is given from official documents, without strongly suspecting that the unfortunate woman who was the subject of it, acted under the influence of an impulse which resulted from disease.*

On the whole it seems to us fully manifest that there is a form of insanity, existing independently of any lesion of the intellectual powers, in which, connected in some instances with evident constitutional disorder, in others with affections of the nervous system excited according to well-known laws of the animal economy, a sudden and often irresistible impulse is experienced to commit acts which under a sane condition of mind would be accounted atrocious crimes. Most of the French writers by whom this affection has been recognised, particularly Messrs. Esquirol, Georget, Marc, and Michu, have termed it monomanie homicide, which is assuredly an erroneous designation, unless the sense of *monomania* is to be changed. That term is always used to express *partial illusion*, or intellectual derangement affecting only a certain train of ideas; whereas, in connection with the homicidal impulse now under consideration, there is confessedly no delusive opinion impressed on the belief, and the intellectual faculties are wholly unaffected.

It must be allowed that instances may and do occur in which the discrimination would be difficult between manifestations of insanity and acts of a criminal nature, and that this difficulty would be increased by the admission of a form of insanity free from hallucination or illusion. For the distinguishing characters of this form of insanity we must refer to the article already cited, and to this we shall add a few particulars, chiefly the observations of M. Esquirol.

1. Acts of homicide perpetrated or attempted by insane persons have generally been preceded by other striking peculiarities of action, noted in the conduct of the same individuals; often by a total change of character.

2. The same individuals have been discovered in many instances to have attempted suicide, to have expressed a wish for death; sometimes they have begged to be executed as criminals.

3. These acts are without motive; they are in opposition to the known influences of all human motives. A man murders his wife and children, known to have been tenderly attached to them; a mother destroys her infant.

4. The subsequent conduct of the unfortunate individual is generally characteristic of his state. He seeks no escape or flight; delivers himself up to justice; acknowledges the crime laid to his charge; describes the state of mind which led to its perpetration: or he remains stupefied and overcome by the horrible consciousness of having been the agent in an atrocious deed.

5. The murderer has generally accomplices in vice and crime; there are assignable inducements which led to its commission, motives of self-interest, of revenge, displaying wickedness premeditated. Premeditated are in some instances the acts of the madman, but his premeditation is peculiar and characteristic.

After all it cannot be doubted that there must be instances extremely difficult of discrimination, but this admission does not alter the matter of fact, or change our conviction that disease leads in some cases to homicide, although the faculties of the understanding are at the same time unclouded by any illusion.

We have dwelt more at length on the form of moral insanity which leads to homicide, because in criminal justice it is the most important, at the same time that it is the most striking and characteristic. But there are other instances to which similar observations may be applied. We could adduce facts which prove that other criminal acts, or acts which are criminal when perpetrated by sane persons, have been attempted or committed under circumstances which left no doubt of their resulting from mental disorder, while yet of that disorder illusion formed no part.

The propensity to suicide is in many particulars analogous to the impulse to homicide. It is doubted by many whether suicide is, in general, really an act of insanity, though a verdict of lunacy is generally found in inquests, owing probably to the extreme barbarity of the penal law on suicide. With relation to this subject the following considerations are, as we think, conclusive.

1. The propensity to suicide is very often combined with the impulse to homicide. This has been observed long ago, but the evidence adduced by M. Falret puts the fact beyond all doubt. (De l'Hypochondrie et du Suicide, p. 170, et seq. Paris, 1822.) These impulses are so often conjoined as to prove clearly that the conditions which give rise to one are in close affinity and conjunction with those from which the other originates.

3. Suicide is in a very marked and striking manner hereditary, and this is a strong ground for regarding it as constitutional, or depending on disorder in the state of organic structure. Dr. Rush, Dr. Esquirol, and others have recorded instances of the hereditary transmission of this propensity. M. Falret has collected a variety of observations on the subject, and has concluded that, of all the forms of insanity, that which distinguishes itself by this tendency is probably that which the most frequently becomes hereditary.

3. Like other forms of madness, suicidal insanity prevails most in certain seasons and temperatures. M. Falret says it is most frequent in the summer and autumn. MM. Fodéré and Duglas observed that at Marseilles suicides were most frequent when the thermometer of Reaumur was 22 degrees above zero.

4. Acts of suicide, like those of homicide, are generally preceded by a morbid change in the character and habits of the agent. Individuals

* Discussion Medico-légale sur la Folie par le Docteur Georget, Paris, 1826. See, also, Examen Médical des procès criminels des nommes Leger, &c. par le Docteur Georget, Paris, 1825; and Nouvelle Discussion Médico-légale sur la Folie, par le même, 1828. See, also, Matériaux pour l'Histoire Médico-legale de l'Aliénation Mentale par M. Marc. Annales d'Hygiène Publique et de Médecine Légale. Paris, 1830.

who had been cheerful, active, animated, taking a lively interest in the pursuits of life, in the society of their friends, in their families, became melancholy, torpid, morose, and feel an aversion towards their relatives or most intimate associates, become listless and indifferent. These appearances have often been observed to be the preludes of some attempt at suicide, and have sometimes put the relatives of the individual on their guard, and have led to a prevention of the fatal catastrophe.

5. Suicide is connected in many instances with diseases of structure, or with disorders of the functions of physical life, some of which have been detected by necroscopy, others by observations made before death. This general fact is sufficiently established on the observations made on the subject by Awenbrugger, Leroy, Fodéré, and Esquirol, although we must confess that the same obscurity yet involves the physical causes of suicidal as of other forms of insanity.

6. Like the impulse to homicide, this propensity to suicide is simply a moral perversion, and therefore neither falls within the restricted definition of insanity, which has been the most prevalent one. There is generally no particular illusion impressed on the understanding of the self-destroyer; on the other hand, there is a perversion of the strongest instinct of nature, that of self-preservation. Nature has ordained no other law more universal in its influence than the desire which all animated beings display, and which is indeed the primary principle in the greater part of their actions, and throughout the whole period of their existence, to preserve their existence, and to secure themselves from the influence of circumstances which bring it into danger. It is the characteristic of moral insanity to pervert the natural instincts or propensities, and suicide displays the most signal of these perversions.

Under the head of *moral insanity* we have adverted to a form of disease of which the principal or sole manifestation is a propensity to break and destroy whatever comes within reach of the individual; in short, an irresistible impulse to commit injury or do mischief of all kinds. This propensity is observed in cases in which it is impossible to discover any motive influencing the mind of the person who is the subject of it. No illusive belief, for example, can be detected, that the lunatic is performing a duty in perpetrating that which manifests his disease. There are, indeed, cases of a different description in which this illusion is the groundwork of the proceeding, but these belong to another class of mental disorders.

Many lunatics, whose disorder was merely a destructive propensity, have set fire to houses or public buildings, and it is not to be doubted that men have been occasionally executed as criminals for such actions, who, if they had been kept in confinement, would have proved to be insane. Until the existence of moral insanity is distinctly recognised, there will always be a danger of this event ensuing on the trials of mischievous lunatics. Popular feeling is generally excited in such instances against the perpetrator of a destructive act, and this circumstance increases by much the probability of a criminal condemnation.

There are several modifications of moral insanity, and two most decided examples which require the arrangements suggested by Hoffbauer in some cases of imbecility: we allude to the placing of individuals under *curatela*, or guardianship, for personal security, who do not require confinement. Extreme parsimony has induced persons to starve themselves. When an individual would destroy himself through this propensity, which is in some instances the effect of disease, (see INSANITY,) he is sometimes declared a lunatic and sent to a place of confinement. There is no other way of proceeding by which his life can be saved under the existing regulation. But confinement is unnecessary for such a person, who is in no way dangerous to society. If the management of his property—for such individuals are generally possessed of property—could be so settled as to ensure his having the usual supports of life, this would be sufficient. Another case is that of profuse extravagance, and this is the most common. Individuals whose moral character is perverted by disease often become profusely extravagant, and the apprehension of ruin to their families is the motive which induces the latter to take measures with a view to prevent such a calamity. Confinement is more often requisite with regard to cases of this description than those of an opposite one, on account of other manifestations of disorder which are combined with the leading propensity; but there are probably many individuals who are wholly incompetent, through a habit of thoughtless extravagance resulting from disease, to administer their own estates, or manage their domestic affairs, and in whose condition there is yet nothing that requires confinement in a madhouse. Many of these are examples of extreme difficulty as to the proceedings which ought to be adopted. It will be advantageous, however, to the medical persons who may be consulted in such cases, to be fully in possession of the circumstances connected with them, and aware of the difficulties with which they are surrounded, although these difficulties may be almost insuperable.

J. C. PRICHARD.

[Of late years, owing, more especially, to the occurrence of some important criminal cases in England, in which there was question of insanity, numerous essays have appeared on the subject by well-informed observers; and in this country an able and comprehensive treatise has been published expressly on the subject of the forensic applications of insanity, by Dr. Ray, (*A Treatise on the Medical Jurisprudence of Insanity*, 2d edition, Boston, 1844,) which has been most favourably received by the medical and legal professions. His views agree mainly with those contained in the previous article, by Dr. Prichard. The cases of Francis, for shooting at Queen Victoria, and of M'Naughten, (*Report of the Trial of Daniel M'Naughten, for the wilful murder of Edward Drummond*, Esq. By R. W. Bousfield and Richard Merrett, Lond. 1843,) who was tried for the murder of the secretary of Sir Robert Peel, and acquitted on the ground of insanity, gave occasion to numerous essays on the responsibility of the lunatic—the chief of which are those of Dr. Prichard (*On the different forms of Insanity, in re-*

lation to Jurisprudence, London, 1842); Mr. Forbes Winslow (*The Plea of Insanity in Criminal Cases*, Lond. 1843), and Mr. Rumball (*M'Naughten.—A Letter to the Lord Chancellor upon Insanity*, Lond. 1843).

These cases led to a review of the whole subject of Insanity, in its relation to Medical Jurisprudence, in the House of Lords, and to answers from the fifteen Judges to questions submitted to them by the Lords, which were read to the House in the name of all the Judges except one (Mr. Justice Maule) by Lord Chief Justice Tindall, on the 19th of June, 1843.

These answers must be regarded as the then legal opinion in England, in regard to the points submitted to the Judges. The questions and answers were as follows:

Question 1. What is the law respecting alleged crimes committed by persons afflicted with insane delusion, in respect of one or more particular subjects or persons;—as, for instance, when at the time of the commission of the alleged crime the accused knew he was acting contrary to law, but did the act complained of, with the view, under the influence of some insane delusion, of redressing or avenging some supposed grievance or injury, or of producing some supposed public benefit? *Answer*. The opinion of the Judges was, that notwithstanding the party committed a wrong act while labouring under the idea that he was redressing a supposed grievance or injury, or under the impression of obtaining some public or private benefit, he was liable to punishment.

Question 2. What are the proper questions to be submitted to the jury, when a person alleged to be affected with insane delusion, respecting one or more particular subjects or persons, is charged with the commission of a crime, murder for example, and insanity is set up as a defence? *Answer*. The jury ought in all cases to be told that every man should be considered of sane mind until the contrary were clearly proved in evidence. That before a plea of insanity should be allowed, undoubted evidence ought to be adduced that the accused was of diseased mind, and that at the time he committed the act he was not conscious of right and wrong. This opinion related to every case in which a party was charged with an illegal act, and a plea of insanity was set up. Every person was supposed to know what the law was, and therefore nothing could justify a wrong act, except it was clearly proved that the party did not know right from wrong. If that was not satisfactorily proved, the accused was liable to punishment; and it was the duty of the judge so to tell the jury when summing up the evidence, accompanied by those remarks and observations which the nature and peculiarities of each case might suggest and require.

Question 3. In what terms ought the question to be left to the jury as to the prisoner's state of mind at the time when the act was committed? *No answer*.

Question 4. If a person under an insane delusion as to existing facts, commits an offence in consequence thereof, is he hereby excused? *Answer*. If the delusion were only partial, the party accused was equally liable with a person of sane mind. If the accused killed another in self-defence, he would be entitled to an acquittal; but if the crime were committed for any supposed injury, he would then be liable to the punishment awarded by the laws to his crime.

Question 5. Can a medical man, conversant with the disease of insanity, who never saw the prisoner previous to the trial, but who was present during the whole trial, and the examination of all the witnesses, be asked his opinion as to the state of the prisoner's mind at the time of the commission of the alleged crime, or his opinion whether the prisoner was conscious, at the time of doing the act, that he was acting contrary to law? or whether he was labouring under any, and what delusion at the time? *Answer*. The question could not be put in the precise form stated above, for by doing so it would be assumed that the facts had been proved. When the facts were proved and admitted, then the question as one of science would be generally put to a witness under the circumstances stated in the interrogatory.

Mr. Justice Maule dissented from this last answer. In his opinion, such questions might be at once put to medical men without reference to the facts proved, and he considered that this had been done, and the legality of the practice thereby confirmed, on the trial of M'Naughten.

A century ago, the doctrine was, that to excuse a man from punishment "he must be totally deprived of his understanding and memory, and not know what he was doing, any more than an infant, a brute or a wild beast,—such a one is never the object of punishment." At the commencement of this century, in the celebrated trial of Hadfield, for shooting at George the Third of England, it was maintained that "delusion, when there is no frenzy or raving madness, is the true character of insanity;" and in order to render the madman irresponsible for crime, it must be shown "that the act in question was the immediate unqualified offspring of the disease." In a few years after, however, the doctrine of "right and wrong" sprang up, which has maintained its ground to the present day; and the jury were instructed to acquit, if the prisoner, at the time of committing the crime, was incapable of distinguishing between right and wrong, and did not consider his act any crime against the laws of God and Nature. The doctrine of right and wrong was forcibly laid down in the case of M'Naughten, by Chief Justice Tindal.

Different interpretations have, however, been given of 'right and wrong;' and, as a practical test, when used in a moral and religious sense, it is inefficient, and always difficult to be established. According to the fifteen judges, *right* and *wrong* would seem to mean *lawful* and *unlawful*. "Before a plea of insanity should be allowed," they say, "undoubted evidence ought to be adduced that the accused was of diseased mind, and that at the time he committed the act he was not conscious of right and wrong;" and they add, "Every person was supposed to know what the law was, and therefore nothing could justify a wrong act, except it was clearly proved that the party did not know right from wrong." Yet numerous cases are on record in which unquestioned madmen have been clearly aware of the illegality of acts they have committed. An intriguing, unruly,

vicious madman was detected with a piece of iron, which he had contrived to shape like a dagger: into this iron he firmly fixed a handle. This weapon was taken away from him. He immediately became excessively abusive, and was placed under restraint. After this he was more violent, and uttered the most revolting imprecations. In a fit of fury he exclaimed to the keeper, "*I'll murder you yet. I am a madman, and they cannot hang me for it.*" When Martin set fire to York Minster, a conversation took place among the inmates of a neighbouring mad-house in relation to the occurrence. The question discussed was, whether Martin would suffer the extreme penalty of the law for the crime. Various were the opinions expressed. In the midst of the conversation, one patient, apparently as mad as the rest, exclaimed: "He (Martin) will not be hanged —of course he will escape." "For what reason?" asked several voices. "They cannot hang him," replied the lunatic, "because he is mad,—he is one of ourselves." (Winslow, *Op. cit.* p. 16, and Guy, *Principles of Forensic Medicine*, Part 2, p. 255, Lond. 1843.)

A recent writer (*British and Foreign Medical Review*, July 1843, p. 108) after objecting to these tests, that they do not answer the purpose intended, and that "a man may know that the act of murder or incendiarism, which he is perpetrating, is wrong, that it is an evil, wicked, and illegal act, and yet be a homicidal monomaniac," suggests that the true and only test of responsibility is, "whether or not the individual had at the time *any power of control over his actions?* and this is probably the best single test; still its application is environed with the same difficulties as the others.

The most atrocious crimes are sometimes committed by persons, the unsoundness of whose intellect had not been previously suspected. A man of the name of Steinberg killed his wife and four children, at Pentonville, near London, in 1834; another, of the name of Staninought, a respectable tradesman, killed his son in 1835; another, Lucas, destroyed his children in 1842; and numerous cases of the same kind might be cited, where there were no previous symptoms of insanity, nor any obliquity of the *moral*, to justify interference. They were cases of homicidal impulse, suddenly arising, and destroying all control on the part of the unfortunate agent; and the fact, that, in most cases, the victims were nearly allied, and previously perhaps dear to the destroyer, assimilate them to those of ordinary insanity, which is apt to be directed towards individuals most closely connected with the insane.

Another difficult case is, where eccentricity or waywardness has existed in an individual, or where insane delusion has been manifested on some unimportant subject, whilst on all others the mind may have been apparently sound,—whether such aberration ought to free from responsibility for criminal acts not connected with such delusion? The usual course in courts of law has been to regard such persons as entirely responsible; yet it is obvious that the rule ought not, in justice, to be held absolute; otherwise cases of homicidal monomania, like those referred to above, must be treated as if they had occurred in those of sound mind, which, even if considered expedient, would scarcely be just. Mr. Chitty (*A Practical Treatise on Med. Jurisprudence*, Amer. edit. Philad. 1835) refers to the case of a lady, who consulted most of the eminent physicians in London on the subject of a piece of wood, which she thought was constantly burning in her throat, and whose mind on every other subject was sound; and we have daily examples of the strangest hallucinations in the hypochondriac. The writer, within the last few years, has attended three persons, who believed that they had a living snake in the stomach, and who could not be persuaded to the contrary. Two of them were engaged in business, and managed all their affairs with their wonted judgment. Suppose, then, that a crime had been committed by any one of these persons, ought he to suffer the penalty of the law? Humanity and justice would certainly suggest that the hallucination indicated an unsoundness of mind, which *might*, under adequate exciting causes, be exhibited suddenly under other forms.

There would be less difficulty in this matter, when a verdict of insanity is rendered in these cases, were the community adequately protected against subsequent outbreaks of a similar character. It not unfrequently happens, however, that medical testimony is adduced in favour of the insanity of a prisoner, when the testimony of the same witness could be easily, and perhaps properly, obtained to show, that at the time of trial, the prisoner was perfectly sane: hence, according to the laws of most, if not all of the States, it is a matter of no great difficulty for one who has escaped punishment on the ground of insanity at the time of committing the offence, to procure, soon after the trial, his discharge from prison under the certified plea of entire restoration; and thus to be left at full liberty to pursue his perilous volition, should fresh causes revive the homicidal impulse. "There are some," says a recent writer, (Guy, op. cit. p. 265,) "who argue, that to confine the insane for life is an injustice, inasmuch as the disease under which they labour may be completely cured. It is an injustice towards the individual, but the step is demanded by a regard to the public safety; and when all the alternatives are weighed, it will be found to be the least injustice that the case allows of. The practical question is this: what amount of injustice are we willing to inflict on the individual in order that society at large may be protected? If the public safety requires that the homicidal monomaniac should be put to death, let the principle be boldly proclaimed and acted on; but if, on the other hand, this seems too great a sacrifice, and too glaring an injustice, we must be content to confine him for life, to prevent the possibility of future mischief. This degree of injustice to the individual a regard to the public safety will justify. Nor is there any good reason to fear that, by exempting the madman from the punishment of death, we shall weaken the hold which the law has on the man of sound mind; for in order that he may escape death, he must successfully feign insanity—a task of no ordinary difficulty—and if he succeeds, a perpetual sacrifice of liberty awaits him. It is not likely, therefore, that society will suffer any injury from the adoption of the course here advocated;

and we may perhaps find, that it gains something by openly attributing to disease some of the most revolting crimes which degrade and debase our common nature."

There is great force in these views; yet the mind revolts at the idea of a person being executed, who under a homicidal impulse has taken the life of another, as in the cases referred to above, where the atrocity of the act was the greatest, and perhaps the sole, evidence of the existence of the mental unsoundness.

In regard to the nature of the testimony relied upon in cases of insanity, and the mode of judging of the same, there is much room for animadversion. Too great weight appears to be given to medical testimony in such cases. It has always been the expressed conviction of the writer, that medical men are no better judges of the existence of mental alienation, than well-informed and discriminating individuals not of the profession. The only advantage, at least, which they can be presumed to have, is from the constant habits of observation and discrimination which the practical exercise of their profession requires. Yet for no other reason than that they belong to the medical profession, inferior men, whose judgments on other subjects would be contemned, are often relied upon to establish the existence or non-existence of a mental condition which demands the most rigid and careful scrutiny. A modern able writer, (*Brit. and For. Med. Rev.* July, 1843, p. 110.) thinks it essential for justice "to abolish medical testimony as it is at present given on trials for crime, where insanity is the plea." "Questions of this important nature," he adds, "should be referred to a board of twelve or more competent men: the state of mind of a person accused of crime should not be left to be decided by those members of the profession whom the prisoner or his friends may select for their known support of his case. As to the question of responsibility and punishment, that should be intrusted to the authorities of the law." The whole subject is, as before remarked, surrounded with difficulties; and hence much room is left for the ingenuity of counsel, to act upon a jury generally composed of men who are eminently unqualified for forming any correct judgment on the intricate subject submitted for their decision.

ROBLEY DUNGLISON.]

MINERAL WATERS. See WATERS, MINERAL.

[MOLLUSCUM.—This cutaneous disease, first so called by Bateman, consists of numerous tumours, varying in size from that of a pea to that of a pigeon's egg, filled with an atheromatous matter, which are developed in the substance of the cutis, and are of various shapes—some round or flattened, and having a large base; others adherent by means of a pedicle.

When the disease is in its simple form, it appears to be wholly local; and after having attained a certain degree of development it is apt to remain stationary through life. Occasionally, as in a case described by M. Tilesius, and in others by M. Biett, the whole body is covered with these tumours, which are at times hard and contain no atheromatous matter, (Biett, in *Dict. de Méd.* xx, 137. Paris, 1839.) M. Biett has seen another variety, more especially in young women after parturition, which consists of small flattened tumours, slightly fissured at the top, of irregular shape, and of a brownish or fawn colour; indolent, and occurring more particularly on the neck.

A more singular variety is that described under the name **Molluscum Contagiosum**, of which many cases have been published of late years. (Paterson, *Edinb. Med. & Surg. Journ.* lvi, p. 279; Henderson, *Ibid.* lvi, 213; Jacobovics, Du Molluscum, &c., Paris, 1840; and Wilson *On Diseases of the Skin*, Amer. edit., Philad. 1843.) It is considered to consist of a morbid enlargement and derangement of the sebaceous follicle, rather than of a tubercular affection of the proper texture of the cutis vera, (Wilson, *op. cit.*), and is characterized by the presence of round, hard tubercles, which are smooth and transparent, and when pressed pour out, from an orifice on their summits, a little opaque or milky fluid. The affection is uncommon,—several of the most experienced dermatologists having seen no case of it. M. Biett affirms (*Op. cit.*) that no case has been observed in France. It is communicable, and is accompanied by tumefaction of the glands, and, occasionally, by so much constitutional irritation as to gradually destroy the patient.

The causes of Molluscum are unknown, and the treatment is unsatisfactory. In simple Molluscum,—the first variety, no mode of management has been of much service; in the variety described by M. Biett, a strong solution of sulphate of copper has dispelled the tumours. In the contagious variety, eutrophics have been prescribed, especially arsenic, and external agents been applied with the view of exciting the tumours to inflammation. The liquor potassæ, and the solid nitrate of silver, have been used with this view.

Dr. R. Paterson is inclined to look upon internal remedies in general as too tedious, "when the local ones can be applied with so little pain to the patient, such surety to the destruction of the tumour, and in so much shorter a space of time."

ROBLEY DUNGLISON.]

MORTIFICATION. The term mortification is generally employed in this country to express that state which has been induced in a part of the body by the complete and permanent extinction of its vital properties. On the continent, however, the term *gangrene* is employed to signify the same state; whilst in England it is more commonly used to denote the incipient stage of mortification: a state of a part in which there is a diminution, but not a total extinction of the vital properties; in which the blood is still supposed to circulate in the larger blood-vessels, and the nerves to retain a part of their sensibility; the complete cessation of circulation and an entire want of sensibility characterize the second or last stage of mortification, which is called *sphacelus*, whether the dead part has or has not become putrid, whether it has been separated or not from the living parts. Again, some pathologists confine the term gangrene to the death of the *superficial* texture of parts, and particularly of the soft parts; and sphacelus, to the death of the *whole substance* of an organ, as of the soft parts and bones at the same time.

Other denominations have been given to this pathological state, founded on particular conditions of the affected part, which have been observed to precede or accompany mortification. Thus, we have what is called *hot gangrene*, or that which is preceded or accompanied by inflammation; and *cold gangrene*, or gangrene without inflammation. We have also *humid gangrene*, from the affected part containing a greater or less quantity of decomposed or other fluids; and *dry gangrene*, when these fluids are not present, or only in very small quantity, and which being frequently the case in gangrene affecting the external parts of old people, has, on that account, also been named *gangræna senilis*.

Although some of these distinctions are, no doubt, of considerable importance, some of them are extremely vague and improper, and much less deserving of our attention than the conditions of the part affected with mortification, and the causes by which this state is induced.

Before entering upon the general considerations which present themselves on the several kinds of mortification which occur, it may be well to remark that we shall employ the terms *gangrene* and *sphacelus* as they are generally employed in this country; that of *mortification* constituting the generic sign of the disease of which they indicate particular stages. Although, however, the adoption of these two terms is founded on the differences which exist between the morbid conditions to which they are applied, and their use is necessary to distinguish a state of a part yet susceptible of recovery from one that is not, we shall find that it is by no means easy to determine—even when external parts are the seat of mortification, and, consequently, when any of the phenomena of this disease are capable of being submitted to actual observation—whether the vitality of the affected part be partially or wholly destroyed. It is, perhaps, on this account, and as expressing also a favourable doubt, that the term gangrene is much more frequently employed than that of mortification or sphacelus.

As the descriptive characters of mortification were originally drawn from the appearances which this disease presents when it attacks the external parts of the body, they have ever since been employed by the pathologist as the means of enabling him to detect it in internal organs after death. It may, however, be fairly questioned whether the application of the term mortification has not been too restricted; and whether parts deprived of their vitality and separated from the living tissues should not be designated by the same appellation as those which, similarly situated, differ from them only in point of colour, and perhaps smell. Softening of the cerebral substance, of the mucous and frequently of the serous membranes, constitutes a state of positive death; but the softened substance, in these instances, presenting neither the peculiar colour nor odour of external parts when mortified, it has been considered necessary to distinguish softening from mortification, by a term expressive of its principal character—that of softness. We shall, therefore, treat in this article only of those states which are usually comprehended under the term mortification.

Considered in a general point of view, and in relation to the causes by which it is produced, or the morbid conditions of the part in which it occurs, we find that mortification takes place in a variety of ways, and under very different circumstances. A knowledge of these facts suggests the propriety of arranging the several kinds of mortification under the three following heads:—

1. Mortification from cessation of the circulation.

2. Mortification from the violent operation of mechanical, chemical, and physical agents.

3. Mortification from the deleterious influence of certain poisons.

Cessation of the circulation in a part of the body may be produced in the three following ways:—by inflammation; by mechanical causes which obstruct the passage of the blood; by local or general debility.

1. Mortification from Inflammation.

There is no tissue or organ of the body which may not become affected with mortification as the immediate or mediate effect of inflammation. Mortification is, however, much more frequently observed in those organs in which the vascular system predominates, or in which an inordinate accumulation of blood is readily produced, on account of their great sensibility and their direct exposure to the influence of those causes which give rise to inflammation. Hence the reason why gangrene and sphacelus occur more frequently in the skin and cellular tissue, mucous membranes and lungs, than in the other tissues and organs of the body, as immediate effects of inflammation; and why they are so rarely observed in serous and fibrous tissues, which contain few or no blood-vessels.

Not only is mortification rarely observed in these latter tissues, but it may also be said never to occur in them as an immediate effect of inflammation, for they are never found in a state of gangrene or sphacelus, unless the cellular membrane with which they are in contact, and from whose vascular system their nutrition is derived, has previously been diseased. Such also is the case in caries, (death of bone,) as a consequence of inflammation of the periosteum and medullary membrane.

These circumstances enable us to explain why, in certain cases, mortification takes place in one tissue and not in another, although the inflammation by which it is preceded is the same in kind, degree, and duration. There are, however, many other circumstances of perhaps still greater importance, the single or conjoint operation of which favours in a most remarkable manner the termination of inflammation in gangrene and sphacelus.

1. Certain diseased states of an organ or tissue—of the solids in general, or of the blood in particular—are circumstances which, while they predispose to inflammation, give at the same time to this pathological state a peculiar tendency to terminate in gangrene or sphacelus of the parts which it affects. Thus, chronic inflammation of a portion of an organ, particularly when accompanied by induration and obstructed circulation of the affected part, is not unfrequently followed by gangrene and sphacelus; and still more frequently is this the consequence of an acute attack of the same disease, either in that portion of the organ previously modified, or in a contiguous portion of it, through

the medium of which the nutrition of the former was derived.

2. In like manner, when inflammation occurs in an organ in a state of congestion, depending on the presence of an obstacle to the return of the venous blood, the danger of its terminating in mortification is increased in proportion to the extent of the obstacle or the degree of congestion to which that obstacle has given rise.

3. The state of general debility which prevails at the termination of protracted fevers, or during the first period of convalescence, is well known not only to favour the development of inflammation, but to give to this disease a great tendency to terminate in mortification.

4. The influence which a diseased state of the blood exercises in the production of mortification is well exemplified in scorbutus; local inflammation in this disease, even when it has only arrived at the congestive stage, frequently terminating with great rapidity in gangrene and sphacelus.

The termination of inflammation in either of these states is likewise regarded by many to depend much on the nature of the cause by which the inflammation has been induced. It would, however, be more correct to say that the termination of inflammation in gangrene or sphacelus depends on the nature of the change which follows the immediate operation of such a cause on the organ in which inflammation afterwards take place.

It is true that, independently of any peculiarity of constitution, a mechanical stimulus will produce inflammation very different in its external characters, intensity, extent, duration, and mode of termination, from that which follows the operation of a chemical agent or certain poisons. But, were we to attribute these differences solely to something peculiar in the nature of the exciting cause, we should find it impossible to account for the various phenomena by which they are accompanied. For, in one case, the inflammation may be intense, and the gangrene by which it is followed comparatively slight in degree and limited in extent; in another, it may be mild or imperfectly developed, and yet gangrene and sphacelus succeed each other to a great extent; and in a third, whether severe or mild, its termination in mortification may take place slowly, or proceed with frightful rapidity. All these varieties, also, are observed, without a corresponding change in the causes by which they are produced; the same cause producing at one time only inflammation, at another gangrene or sphacelus.

Instead, therefore, of seeking in the nature of the exciting cause itself an explanation of these remarkable differences, we must have recourse either to the peculiar change which it has induced in the part which afterwards becomes the seat of inflammation, or to some previous modification of the kind to which we have already alluded; such as a morbid state of an organ, of the body in general, or of the blood in particular.

The above are some of the more remarkable of the circumstances which favour the development of gangrene or sphacelus as a consequence of inflammation: the following are some of those which exercise an opposite influence.

1. The first of these in importance is a perfect state of health, whereby inflammation, instead of terminating in gangrene or sphacelus, as it would have done in an individual less favourably circumstanced, is limited to one or other of its more simple forms, — as the adhesive, suppurative, or ulcerative.

2. The structure and situation of an organ, whereby the increase in quantity of the fluids of nutrition and secretion, which takes place during inflammation, is either entirely prevented, or very limited in degree and extent. All secreting organs or surfaces which possess a free exit to their superabundant fluids, natural or morbid, furnish examples of this kind; as the serous and mucous membranes, which, compared with the testes or breasts, in which the circulating and effused fluids are retained, are rarely the seat of gangrene or sphacelus as the direct consequences of inflammation.

3. The importance of an organ, whereby death supervenes before mortification can take place as a consequence of inflammation. Mortification of the brain and heart seldom or never occurs, unless when it follows inflammation produced by the direct operation of mechanical causes. When it occurs as an idiopathic affection in the brain and heart, the derangement of function by which it is accompanied becomes so great not only in these organs themselves but throughout the whole body, that general death supervenes, before the inflammation has acquired that degree of severity which gives rise to local death or mortification.

General phenomena of Gangrene and Sphacelus. — As the more remarkable changes which take place in the circulation, innervation, temperature, colour, and consistence of a part affected with gangrene or sphacelus, as a consequence of inflammation, are seldom observed unless on the external surface of the body, we shall describe them as they occur in the skin and subjacent parts.

When inflammation is about to terminate in gangrene, the inflammatory redness assumes a darker tint; it becomes deep purple, livid, or almost black; the temperature of the part diminishes, but not always its consistence, which, on the contrary, may be increased, from the presence of accumulated fluids; small vesicles appear on its surface, formed by the effusion of serosity, or serosity and blood, under the epidermis; the sensibility of the part, which, as well as the temperature, was previously increased, is now much diminished, and the seat of the pain which accompanies the inflammation is transferred to the deep-seated tissues in contact with those which have now passed into the state of gangrene.

When these modifications of colour, consistence, temperature, and sensibility, continue to increase, and terminate in sphacelus, the part thus affected assumes a still deeper tint; it becomes of a dirty brown or black colour, sometimes grey, greyish yellow, or greenish. The vesicles or phlyctenæ become more numerous and larger, or the whole of the epidermis covering the sphacelated part may be completely separated and distended with bloody serum, or ruptured from the same cause, and lying in wrinkles in the denuded and discoloured cutis. The skin and cellular tissue beneath the epidermis are swollen and puffy, and crepitate when pressed; or they are soft, and flaccid, and cold, and may be cut, pinched, or

otherwise stimulated, without pain or feeling of any kind being induced: and, lastly, the sphacelated surface emits a strong cadaverous odour.

When these latter appearances present themselves, but more particularly when the peculiar odour of gangrene is perceived, they may be regarded as certain signs not only of complete death of the affected part to a certain depth, but also that putrefaction has already taken place. The local emphysema and fetor of putrefaction produced during life, constitute, therefore, signs of great value in mortification. Their absence, however, furnishes no proof that local death may not already have taken place; for putrefaction or chemical decomposition of an organ may not follow as a consequence of the cessation of those powers by means of which it was enabled to resist the injurious influence of external agents, until some time has elapsed, the length of which will depend on various circumstances, but more particularly on the quantity of fluids contained in the affected organ, and the degree of temperature to which it is exposed.

So long as gangrene continues to spread, the dark-red colour by which it is characterized is diffuse, and loses itself insensibly in the surrounding skin. But when it is about to terminate favourably, the dark-red colour becomes more circumscribed, gradually disappears, and is replaced by a brighter red, which extends over the affected surface, accompanied by a diminution of the swelling and pain. By-and-bye the natural temperature returns, and the healthy characters and functions of the part are restored, without any solution of continuity having taken place.

A similar change of colour is observed to precede the cessation of sphacelus. It appears on the limits of the dead parts in the form of a narrow circle, and announces that adhesive inflammation, the means which nature employs to arrest its progress, has commenced. Ulceration then takes place along the internal border of the inflamed skin, and a separation is thus effected between the living and dead parts, the latter falling off in the form of what is called a *slough*. The loss of substance which is thus occasioned, is either partially or wholly repaired by means of the coagulable lymph which is thrown out on the denuded surface, and which, becoming organized, assumes a membraneous or granular form, according to the nature of the tissue to be repaired, and constituting ultimately what is called a *cicatrix*.

Such are the general characters of mortification produced by inflammation of the skin and subjacent textures. We say subjacent textures, because inflammation of the former, when such as to produce gangrene and sphacelus, is always complicated with inflammation of the latter.

In other tissues and organs these phenomena are, as we have already observed, more or less modified: the differences which they present depending principally on the degree of vascularity and sensibility of the affected organ. Hence the variety observed in the quantity of blood, and the kind and extent of the effusion by which it is followed in inflammatory gangrene and sphacelus; the change of bulk which organs undergo in either of these stages of mortification; the extent to which their temperature and sensibility may be reduced before they become actually dead; and the length of time that elapses from the commencement to this the ultimate effect of the disease. Examples of these varieties will be found in the following details on mortification of particular tissues and organs.

Mortification of particular tissues from Inflammation.

1. Mortification of the Cellular Tissue.—The cellular tissue is not only more frequently the seat of mortification, but is also more extensively and more rapidly destroyed by it, than any other tissue of the body. It presents, likewise, considerable variety in these respects, in different parts of the body; gangrene and sphacelus occurring more frequently in the subcutaneous than in the submucous cellular tissue; in the fingers more frequently than in the toes; in the thigh and arm than in the leg and fore-arm, owing to the one being more exposed than the other to external injury, or other exciting causes of inflammation.

A greater quantity of cellular tissue in one part than in another, whereby the diffusion of the effused fluids is facilitated, and the presence of fibrous envelopes which afterwards prevent their escape to the external surface, contribute likewise to the greater frequency of the disease, and favour its extension and the rapidity of its progress. The most remarkable example of the influence which these circumstances exercise in the production of gangrene and sphacelus of the cellular tissue, is met with in *erysipelas phlegmonodes*.

a. Subcutaneous cellular tissue.—When erysipelas attacks the subcutaneous cellular tissue of the extremities, and although it may at first be limited to a very small space of the forearm, for example, it sometimes spreads with great rapidity over the whole of that part of the limb, extends upwards to the shoulder and neck, and descends along the back, breast, and side. Throughout the whole of this course the muscles, blood-vessels, nerves, and tendons are laid bare, and float in the putrid cellular tissue, and in the serosity, pus, and blood, that are effused during the violence of the inflammation.

Such is the state of the cellular tissue not only in erysipelas phlegmonodes when it occurs as an idiopathic disease, but also when it succeeds to slight wounds or punctures of the arm in blood-letting, and the fingers in dissection. In such cases the cellular tissue appears to be the primary seat of the inflammation, which may either extend in the manner we have described, or be confined to the cellular sheath of the blood-vessels. In the latter case we have frequently what is called phlebitis; the venous circulation is interrupted; the blood ceases to circulate, coagulates, and nutrition not being maintained by the formation of a collateral circulation, gangrene of the extremity follows as an inevitable consequence.

Besides the *diffuse form* of gangrene and sphacelus of the subcutaneous cellular tissue, there is also a *circumscribed form* which is observed in furunculus, common carbuncle, or anthrax. The great accumulation of blood, and the still greater and rapid effusion of serosity which takes place in these circumscribed acute inflammatory affections, produces a state of extreme induration and compression of the cellular tissue, a greater or less

portion of which being thus as if strangulated, dies from want of nutrition, becomes separated from the living parts, and is expelled, in the form of a grey or straw-coloured spongy or pulpy mass, through an opening made in the skin by a similar process, by ulceration, or a surgical operation.

In cynanche parotidea, or mumps, the cellular tissue of the salivary glands is very similarly situated as in carbuncle or anthrax. It is this tissue that is the seat of the inflammation, congestion, and effusion; and being prevented by the unyielding nature of the glandular tissue of the organ from accommodating itself to the increased quantity of the fluids thus poured into it, it soon sloughs, even sometimes before the glandular tissue has undergone any remarkable change of colour or consistence, and before suppuration has commenced.

It may be remarked here that mortification of the adipose tissue always follows that of the skin and cellular tissue, and in fat persons occasions sometimes the most frightful loss of substance.

b. Submucous cellular tissue.—When *diffuse* or *circumscribed* inflammation of the cellular tissue, terminating in gangrene or sphacelus, occurs in internal organs, it presents the same general characters as those we have just now described. In these, however, it never proceeds to the same extent as when it affects the external parts of the body, either on account of the progress of the disease being checked by one or other of the circumstances to which we formerly alluded, or from death taking place at a very early period.

The *diffuse form* of the disease in internal organs is seldom observed except in the pharynx and larynx, either as a primary affection or in connection with erysipelas phlegmonodes of the limbs, face, or neck.

In these situations the sloughing of the submucous cellular tissue is very limited, and always accompanied by a corresponding state of the mucous membrane which covers it. The effusions of albuminous and puriform fluids which take place at the same time, occasion a great increase of bulk, and produce dysphagia, great difficulty of breathing, or complete asphyxia. Hence the frequently fatal termination of the disease before it has passed into gangrene or sphacelus, and which has sometimes been described under the name of serous, albuminous, and purulent œdema of these parts.

Circumscribed inflammation of the submucous cellular tissue terminating in gangrene and sphacelus, seldom occurs as a primary affection. It follows, in general, inflammation of the mucous membrane, but may afterwards proceed to a considerable extent, and occasion sloughing of all the other tunics of the organ in which it occurs, but more particularly those of the intestinal tube: such is a frequent cause of intestinal perforation, and the fatal peritonitis by which it is followed.

c. Sub-serous cellular tissue.—Gangrene of this tissue as a consequence of inflammation is more frequently observed than sphacelus. Neither of them occurs to any great extent, even where this cellular tissue is most abundant, and where it might be called *retro*-serous rather than *sub*-serous, as in the mediastinum, iliac and lumbar regions.

Inflammation assumes a gangrenous termination more frequently in the sub-peritoneal than in the sub-pleural cellular tissue. In some forms of peritonitis, for example, this state is very marked, although not to be detected by ocular inspection. It is only after the peritoneal covering of the intestine has been divided circularly, and the intestine itself is stretched or pulled out, that the diseased state of this tissue becomes visible. When thus treated, the intestine may as it were be *unsheathed*, that is to say, drawn out of its peritoneal covering, the muscular coat now constituting its external surface.

The great facility with which the sub-serous cellular tissue is thus torn in some cases of acute peritonitis, its pulpy softness in some points, and occasionally a certain degree of fœtor, disposes us to believe that these morbid appearances indicate a near approach to it, if not an actual state of gangrene.

In the cavity of the pelvis, and in the iliac and lumbar regions, these appearances are more marked and more easily detected. Not only gangrene but sphacelus of the cellular tissue is occasionally found in these regions; the inflammation which precedes it being sometimes confined to the cellular tissue, at others extending to the peritoneum.

Gangrene and sphacelus of the sub-peritoneal cellular tissue occurs more frequently in the cavity of the pelvis than in any of the other regions which we have named, on account of the number and importance of the organs which it contains.

Chronic and acute diseases of the uterus and rectum, as cancer and phlebitis, extend their ravages to this tissue, and excite gangrenous inflammation.

External violence, also, is not an uncommon cause of a similar state of disease in this situation; and we have known more than one case in which a blow or fall has occasioned, from the supervention of inflammation in the cellular tissue, extensive destruction of the contents of the pelvis, such as denudation and necrosis of a part of the sacrum, gangrene and sphacelus of the neck of the uterus, and perforation of the vagina.

d. Lamellated cellular tissue, or that which separates the larger subdivisions of organs. Gangrenous inflammation of the cellular tissue of muscular, glandular, and other organs, is less frequently observed than the former as a primary disease. It is only in certain of these organs, particularly the muscles of voluntary motion and the lungs, that we can detect with certainty its existence as a primary affection. We shall notice its occurrence in the latter only, on account of the peculiar character of the lesion to which it gives rise in this organ. A distinct layer of cellular tissue separates, one from the other, the numerous lobules of which the lung is composed. Either of these—the interlobular cellular tissue, or the lobules themselves—may become the special seat of gangrenous inflammation.

When a portion of lung is examined, in which the interlobular cellular tissue is alone or principally affected, it presents a number of lines of considerable breadth, of a straw-colour, having the peculiar distribution of the lobules, and formed by the effusion of pus into the cellular tissue by which they are separated. In this stage of the

inflammation, the cellular tissue is either very soft or easily ruptured, and when sphacelus takes place, is converted into a grey pulp, in which one or several lobules float, attached only by a narrow peduncle composed of their respective blood-vessels and bronchi obliterated.

2. Mortification of Mucous Membranes.—Although inflammation of the mucous membranes is not unfrequently observed to terminate in gangrene and sphacelus, such is by no means so frequently the case as was imagined by the older pathologists. Great congestion, some forms of melanosis, and several other kinds of discoloration of this tissue, produced not only during life but after death, were frequently confounded by them with mortification. The mucous membrane of the throat and intestines is more frequently the seat of this disease than that of any other organ.

In the former it is occasionally met with to a limited extent in cynanche tonsillaris and pharyngea, and constitutes the distinctive anatomical character of cynanche maligna or angina gangrenosa, whether it occurs alone or in connection with scarlatina.

In the latter it follows as a consequence of certain forms of acute enteritis, either when the inflammation affects the mucous tissue itself, or its follicular structure at the same time.

In either of these situations the mucous and follicular textures are primarily affected, and may be converted into sloughs of considerable extent, without the submucous cellular tissue being destroyed.

Thus deprived of their vitality, the mucous and follicular textures are, at first, of an ash-grey or straw-colour, and may afterwards become brown or black. They are, however, frequently of the colour of the matter with which they are in contact: the fluid part of which is readily imbibed by the soft, spongy tissue of the slough.

The mucous membrane which surrounds the slough is generally gorged with blood, indicating either a state of great congestion, or gangrene. Its colour, particularly in the throat, is livid or deep purple. When, however, the gangrenous inflammation is confined to the follicles, as those of Peyer (glandulæ agminatæ), and when the greater part or the whole of the follicle has sloughed, little congestion or inflammatory redness may remain. And, besides, if these glands have previously been the seat of disease, as in tubercular phthisis or chronic enteritis, a slight attack of acute inflammation may be sufficient to destroy their vitality, without any remarkable increase of vascularity or redness being found in them to indicate the nature of the destructive cause.

In this, as well as in many other cases of the same disease in other parts of the body, the state of sphacelus must be determined by the colour, consistence, and smell of the part, taken in connection with the other collateral negative evidence, afforded by the absence of any other cause capable of producing such a state.

On the inside of the cheeks, the surface of the velum and amygdala and pharynx, the presence of circumscribed portions of inspissated mucus, or small patches of coagulated albumen or lymph, formed on the surface of the mucous membrane or epithelium, may likewise be confounded with sphacelus. Detached portions of the epithelium may also assume the appearance of sloughs of the mucous membrane.

Gangrenous inflammation of the mucous membrane of the air-passages is by no means common, unless it be accompanied by a similar disease of the pulmonary tissue, in which case it is generally confined to the smaller bronchi. We have, however, seen it follow perforation of the trachea from malignant disease of the œsophagus, and necrosis of the thyroid cartilage, to which we shall refer more particularly afterwards.

The mucous membrane of the genital and urinary organs is seldom affected with mortification, unless it has been previously injured by mechanical causes, as in some cases of stone of the bladder and kidneys, in lithotomy, stricture of the urethra, and difficult labour, by the improper use of instruments, and also the pressure of the head of the child, to which we shall afterwards refer more particularly, as belonging to another division of our subject.

Of these two systems of organs, the uterus presents the most marked examples of mortification as an immediate consequence of acute inflammation. It attacks the internal surface of this organ either immediately or shortly after delivery; is confined to a small portion of it, particularly to that which gave attachment to the placenta; or occupies its whole extent. The colour of the part affected is of a dirty yellowish grey, brown, black, sometimes greenish or bluish; it feels soft or spongy, is easily torn, and is generally covered with putrilaginous fluid substance of a strong gangrenous odour. When this substance has been removed, the surface is generally found to be rough and irregular, from the presence of the remains of the placenta, and more frequently from an exudation of fibrinous matter, which we have sometimes found to cover the whole surface from the fundus to the os tincæ.

The substance of the uterus is sometimes affected in this manner to a considerable depth, but is more frequently only softened, without having undergone any remarkable change of colour. The presence of pus in the fibrous structure of the uterus is seldom observed beyond the gangrened or sphacelated surface, but is frequently met with in the veins and lymphatics. The appearances which we have described as occurring in gangrenous inflammation of the internal surface of the uterus present considerable variety, owing, apparently, to differences in the seat and extent of the inflammation, and the period at which it proves fatal. But as the investigation of these and other circumstances connected with the pathology of this important subject does not come within the scope of this article, we must refer the reader for further information to the articles Puerperal Fever and Uterine Phlebitis.

3. Mortification of Serous Membranes.—The few general remarks which we have made on gangrene and sphacelus of the sub-serous and retro-serous cellular tissue, show that the same morbid states must occur in the serous membrane itself. For as the blood-vessels of this membrane are principally, if not entirely, derived from those of the cellular tissue with which it is in imme-

diate contact, any disease capable of arresting the circulation in the vessels of the latter, must be followed by a similar result in those of the former, the portion of which so circumstanced being soon deprived of its vitality. This is, in fact, the mode in which serous membranes become affected with gangrene or sphacelus. It is not from their being loaded with blood, under the stimulus of inflammation, that they die and are separated, but from the supply of their nutritive fluid having been cut off, on account of the morbid condition of the circulation in the cellular tissue to which we have just alluded, or from this tissue having been destroyed by suppuration, ulceration, or sphacelus. Sloughing of the serous membrane occurs from one or all of these morbid states, the immediate or subsequent effects of inflammation, and is often followed by a solution of continuity which establishes a communication between the serous cavity and that of the neighbouring organ; such as between the cavity of the peritoneum and that of the stomach, intestines, uterus, kidneys, and gall-bladder, or between the cavity of the pleura and bronchi. The contents of these organs are effused into the serous cavities, and excite a degree of inflammation which is seldom equalled either in the rapidity of its progress or the certainty with which it destroys life. The inferior portion of the small intestine is the seat and source of these fatal changes of structure much more frequently than any other portion of the digestive tube, or any other organ of the body. And, besides, sloughing of the peritoneum perhaps never occurs under the circumstances we have already mentioned, except in the situation of the glands of Peyer, or occasionally in those of Brunner. Inflammation of these glands is extremely common in various diseases of the digestive organs, and whether acute or chronic, may give rise to the same fatal result, viz. perforation of the intestine and peritonitis. (See Perforation of Organs.)

The colour of the sphacelated serous membrane is generally of an ash-grey, sometimes ochrey from the presence of bile or blood. It is soft and spongy, and frequently does not present any peculiar smell. Before it separates, the sub-serous cellular tissue around it is frequently seen injected with fine red capillaries; occasionally, also, all the tunics of the intestine are pale, and the accidental opening appears as if it had been made by excision. But the external border of the opening is always smooth, although irregular, whilst on the internal surface of the intestine it is rough or ragged, or presents other marks of being ulcerated.

A dark brown, dark blue, or black colour of the peritoneum, extending over a considerable portion of its surface, has frequently been described by older authors as indicating the presence of mortification of this membrane. These discolorations, however, depend on causes very different from those which give rise to mortification, and the nature of which is particularly noticed in the article Melanosis.

Gangrene and sphacelus of the pleura take place under circumstances very similar to those which produce them in the peritoneum. Sloughing of the pleura is, however, by no means so frequent as that of the peritoneum, as a consequence of inflammation of the sub-serous or pulmonary tissue. This is owing, in the first place, to the pleura pulmonalis receiving a superior supply of nutritive material from the highly vascular tissue of the lungs, as well as from the interlobular cellular tissue with which it is continuous; and in the second place, from its not being so exposed as the peritoneum, when laid bare, to the operation of highly stimulating fluids.

Gangrenous inflammation of the pulmonary tissue is, next to the presence of tubercle, the most frequent cause of perforation of the pleura pulmonalis from sloughing.

The presence of air and other fluids in pneumothorax and empyema have been known, either from their stimulating qualities, or the mechanical distension which they occasion, to produce gangrene and sphacelus to a considerable extent, of both pleuræ; and the violent inflammation which follows some mechanical injuries is well known to produce a similar effect.

Sloughing of the serous membranes of the brain we have never seen as an immediate consequence of their inflammation; nor do we believe that it ever occurs to any extent, unless it is induced by a mechanical cause, such as wounds and blows on the external surface of the head, or the presence of foreign substances in the brain itself. The same may be said of synovial membranes.

4. **Mortification of Fibrous Membranes.**—We have already stated that these membranes become deprived of their vitality, slough, and are separated, only when the cellular tissue with which they are in contact has previously been destroyed. The death of cartilage and bone, as fibrous tissues, takes place in a similar manner,—that is to say, from previous disease of the perichondrium or other contiguous tissue, and of the periosteum. It is, however, worthy of remark, that the vascular system of the medullary membrane, particularly of long bones, may be the primary and chief seat of the disease, which afterwards gives rise to necrosis and sphacelus of the periosteum. We allude here to phlebitis of the medullary membrane, which succeeds to amputation and some external injuries; and, although belonging, in this case, to the province of surgery, it is more immediately connected with medicine, and the duties of the physician, than might, at first sight, be believed. For it is of importance, not only in a surgical point of view, to know that such is the nature of the inflammation which often follows amputation and some diseases of bone, but also as regards the diagnosis and treatment of the diseased states to which it so frequently gives rise in internal organs. Thus, we have not only purulent infiltration in the lungs, liver, brain, &c., but, in some cases, also gangrene and sphacelus, particularly in the two former of these organs, as consequences of phlebitis of the medullary membrane of bone.

5. **Mortification of Muscular Tissue.**—Inflammation of muscular tissue seldom terminates in mortification, unless produced by an injury which affects at the same time other neighbouring tissues. Gangrene and sphacelus of the muscular tissue of the organs of deglutition and digestion, and perhaps of the heart, sometimes accompanies similar states, or severe inflammation of the other tissues with which it is in contact,

but particularly of the cellular tissue. The loss of substance, thus occasioned, of the muscular tissue in a hollow organ such as intestine, becomes afterwards a serious, and, perhaps, irremediable evil; for muscular tissue not being reproduced, a cicatrix, equal in extent to the loss of substance sustained, is formed, which, possessing a contractile property, gradually diminishes in bulk, and ultimately constricts, even to complete obliteration, the cavity of the tube in which it exists. Such instances are not rare in the small intestines after fever, and the writer possesses a delineation of a case in which there were three strictures of the small intestine, through which only a small probe or writing-quill could be passed.

We have not seen a case of gangrene of the heart, unless some forms of softening, to which this organ is liable, are to be regarded as of this nature. (See SOFTENING OF ORGANS.)

Gangrene and sphacelus of arterial and venous tissues may be noticed here, from the functional connection which exists between them and the heart. They are observed more frequently in the latter than in the former tissue, but do not occur in either until after the cellular sheath of the vessels has been destroyed.

When gangrene or sphacelus of the *spleen* is observed, it is found to follow external injury, followed by peritonitis, or, as it is believed by some, a morbid state of the blood, with which it is in general greatly distended, as in severe cases of some intermittent and remittent fevers of marshy countries. The appearances, however, which this organ presents in these fevers is, perhaps, in a great measure owing to putrefaction.

Mortification of particular Organs from Inflammation.

Having pointed out what appears to be the most important of the circumstances observed in mortification of the elementary tissues of the body, we shall now proceed to describe those which present themselves when this disease takes place in organs. In doing so, we shall confine ourselves to the consideration of mortification of what is called the *parenchyma* of organs, or what in more precise language may be called the *compound tissue* of organs,—the result of a peculiar combination of the simple or elementary tissues.

We have already remarked that the frequency of mortification, the extent to which it proceeds, and consequently its severity, are, *cæteris paribus*, in proportion to the quantity of the cellular and vascular elements which enter into the composition of an organ. In this point of view no organ of the body is so conspicuous as the lungs, and in none does mortification occur so frequently, or proceed to such an extent. Being exposed, too, to the direct influence of a great number of those agents which excite inflammation, as well as to the injurious operation of those causes which produce, mechanically or otherwise, great derangement of the circulation in general, the frequency of the occurrence of mortification in this organ is very considerably increased. For these reasons, and because of the characters of the disease being particularly well marked, we shall commence with the description of mortification of the pulmonary tissue.

1. Mortification of the pulmonary tissue, [*Gangrene of the Lung, Necropneumonia.*] — Although inflammation of the pulmonary tissue is extremely common, it does not frequently terminate in mortification. It is, however, highly probable that inflammation of this tissue proceeds frequently the length of the first stage of mortification of gangrene, without our being able to take cognizance of it during life, or, in a great many cases, to detect it after death.

[Of 305 cases of pneumonia, analyzed by M Grisolle (*Traité Pratique de la Pneumonie*, Paris, 1841), not one ended in gangrene; and of 75 cases of pulmonary gangrene, described in the Medical Journals, not more than 5, at the most, according to the same observer, could be fairly pointed out as the sequence of pneumonia.]

At one period of the history of pathological anatomy, mortification of the lungs was recorded as a common occurrence. The fallacy of this statement was pointed out by Laennec, who considered *gangrene* (used by him in the sense in which we have employed mortification) as rather a rare disease; but it is by no means so rare as this distinguished author was disposed to believe. He states, in his work on "Mediate Auscultation," that he had only met with two examples of it in the course of twenty-four years, and that he knew of only five or six cases of it that had occurred in the Parisian hospitals during the same space of time: we ourselves have seen twice the number of cases in the same hospitals, during a period of not more than three or four years.

[The disease is certainly not so frequent as is usually imagined. It does not often occur in private practice, but in eleemosynary institutions, into which those of broken-down constitutions are freely admitted, it is often seen. In the Philadelphia Hospital, in the nine months prior to August 1838, four cases were admitted, all of which terminated fatally. "It is a disease," says Dr. Craigie, "the presence of which it is difficult to distinguish, in the early stages, from that of other diseases of the lungs; its determining causes are totally unknown, and it is not known that in any genuine instance of it the patient has made a recovery."]

When, as a consequence of inflammation, the pulmonary tissue is affected with gangrene, its colour becomes of a deep red, approaching almost to black, whilst its consistence equals that of hepatized lung or liver. When pressed, it breaks down between the fingers like a portion of hepatized lung when similarly treated, but instead of pus, there oozes out from it blood and a dirty white or greenish fluid of the consistence of milk or treacle, having a very disagreeable odour.

When decomposition has taken place throughout the whole of the affected part, or in other words, when the state of sphacelus is produced, the pulmonary tissue seen under the pleura appears sunk beneath the surrounding surface, presents a dirty white, yellowish grey, brown, or greenish black colour, and frequently, when extensive, a mottled aspect, in which all these tints are perceived; it feels flaccid and pulpy, and, when cut into, appears as if converted into a putrid sanies, in which shreds of pulmonary tissue and blood

vessels float or lie detached, and which diffuses around the most insupportable odour of sphacelus.

Complete death of the pulmonary tissue may take place in several points of the same lung at the same time, but in such cases it is limited in extent, and is much more frequently the result of a septic agent than of inflammation. It is when it is confined to one point that it has been found to extend so as to occupy the fourth, the half, or even the whole of a lobe.

In both cases the sphacelated substance may be limited all round by the adhesive inflammation, or it may be confounded with a gangrenous state of the neighbouring tissue. In the first case we have what is called *uncircumscribed* [or *diffuse*], in the second *circumscribed* mortification. The more extensive, however, the state of sphacelus, the more rarely do we find adhesive inflammation to have taken place.

In the circumscribed and multilocular form of sphacelus, we have sometimes found it confined to one, two, or a very limited number of lobules, the line of separation between the healthy and diseased parts being distinctly marked by the interlobular cellular tissue. In this form of the disease, therefore, we are disposed to believe that the gangrenous inflammation commences in, and is confined to, the pulmonary tissue; whereas in the uncircumscribed and diffuse form it attacks both the pulmonary and interlobular at the same time.

The circumscribed and multilocular form of sphacelus just described may have its seat deep in the substance of the lung, or immediately under the pleura. In the first case one or more of the bronchial tubes are perforated, and thus afford an exit to the dead pulmonary tissue, which is gradually discharged by expectoration. In the second case, besides this salutary mode of evacuation of the sphacelated part by perforation of the bronchi, there is another which frequently takes place, and becomes the immediate cause of death, viz., perforation of the pleura. We have already said that sphacelus of the pleura pulmonalis, when a consequence of inflammation, depends on the previous destruction of its sub-cellular and pulmonary tissue, on account of its nutrition being derived from the vessels of these tissues. Sphacelus of either, therefore, is followed by sphacelus of the pleura, which then presents an appearance similar to a portion of skin destroyed by the cautery or caustic potass. When the slough thus formed is separated, or merely ruptured by the pressure of the fluids or air beneath it, a communication is established between the cavity of the pleura and that produced by the destruction of the pulmonary tissue: one of two consequences then follow; viz., acute pleurisy alone, or pleurisy combined with pneumothorax. In the first case the gangrenous excavation communicates only with the cavity of the chest; in the second, with this cavity and the bronchi at the same time. It is this latter condition of parts which enables us to explain the formation of pneumothorax in this disease, although in some rare cases a gaseous product has been found without perforation of the bronchi, and which appeared to have been the product of decomposition.

When circumscribed sphacelus is not immediately followed by a fatal termination, the lung is found some time after to contain a certain number of excavations of an ulcerous character, the nature and origin of which were either imperfectly or not at all understood, until investigated by Laennec.*

[In all the cases of gangrene of the lungs that have fallen under the author's observation, the subjects were addicted to spirituous liquors. The only pathognomonic symptom, as has been observed by Dr. Stokes (*on Diseases of the Chest*, Amer. edit., p. 324, Phil. 1844), is the extraordinary and disgusting odour of the breath and expectoration, which is generally constant, but in some cases may not be readily appreciated unless the patient is made to cough.

The treatment consists in the employment of the chlorinated preparations internally, or of chlorine by inhalation,—in allaying irritation by opium, and supporting the patient by wine-whey and nourishing diet.]

2. Mortification of the Liver. — Mortification of the substance of the liver is an extremely rare occurrence as a consequence of inflammation; so rare is it indeed, that we have not met with a single well-marked case of it in the course of twelve years, during which period the writer has been in the almost daily habit of inspecting the bodies of the dead, and of examining with care every organ of the body. Nor does it appear that it is a more frequent occurrence even in warm climates, where the liver is so often the seat of acute inflammation. "Gangrene," says Annesley, "has been remarked by many writers and teachers as one of the terminations of acute inflammation of the liver; but although we have observed this disease, and made *post-mortem* examinations of it, the number of which has not been exceeded by any other intertropical practitioner, we have never seen a single case of gangrene of this viscus. We are inclined to believe that the appearances which have been taken for gangrene have been merely that black, congested, and softened state of the organ which is sometimes observed in the more acute attacks of disease supervening to congestion, or, at least, this state of the viscus having speedily run into gangrene after the death of the patient; and therefore, if gangrene had actually existed at the time of dissection, it is to be considered as a consequence of death rather than as a termination of the disease."†

3. Mortification of the Kidneys. — Gangrene and sphacelus of the substance of these organs is very rarely met with, unless the exciting cause has been of a mechanical or chemical nature: we shall therefore defer what we have to say on mor-

* See Traité de l'Auscultation Médiate, &c. vol. i. p. 445; and the article Ulceration in this work.

† Annesley on the Diseases of India, &c., vol. i., p. 434. The explanation given by the author of the appearances to which he refers may be correct, that is to say, that they may have been produced after death; but that any disease can "run into *gangrene* after death," is what we cannot admit without confounding together opposite phenomena, and the limits which language has established between them. *Gangrene* being the decomposition of a living tissue, can only take place in a body that is not dead. *Putrefaction* is the term which the author should have employed, and is used in contradistinction to that of gangrene, to denote the decomposition which takes place in dead animal matter.

tification of the kidneys until we come to consider the influence of these agents in the production of this disease.

The *testes* and *mammæ* are occasionally affected with gangrene and sphacelus as the consequences of inflammation or mechanical violence, and both organs are sometimes so extensively destroyed as to be rendered unfit for the accomplishment of their important functions: but as the treatment of mortification of these organs requires the skill of the surgeon, we shall not enter into the description of its pathological characters as it occurs in them.

There now remains to be described, mortification of the *lymphatic* and *salivary glands*, and of the *brain* and *nerves*. In neither of these compound tissues, however, is this disease observed (unless in some very rare instances, and then limited in extent,) as a consequence of common inflammation. The former are not unfrequently affected with this disease, where they are superficially seated, and where they are exposed to the influence of certain putrid and septic substances carried into them by absorption, and to which we shall refer in another place. The latter have seldom presented any traces of gangrene or sphacelus except in cases of external injury, pressure, or ligature.

To render the enumeration of the tissues subject to death from inflammation complete, we may also mention the *teeth*, *hair*, and *nails*. Inflammation of the capsule, bulb, or roots of these bodies, is frequently followed by their decay and entire separation.

State of the Vascular System in Mortification.—Were we to confine our observations to the changes which take place on the external surface of organs affected with inflammation terminating in mortification, as we have done in the preceding pages, we should form a very imperfect idea of the real nature of this disease. In this as well as in every other morbid state, we must look into the interior of the affected organ, examine the several elements of which it is composed; determine the changes that have taken place in each, the order of their succession, and, as far as it may be possible, the influence which they exercise in the production of the various phenomena of the disease. The interesting experiments and anatomical and microscopical investigations which have been made by several distinguished pathologists on this part of our subject, will enable us to give satisfactory information on several of these important points.

When the transparent part of an animal, such as the web of the frog's foot or mesentery of the rabbit, is placed under the microscope, and submitted to the stimulating influence of a mechanical or chemical agent, the capillary vessels of the part, as well as the blood which under these circumstances flows into them, are seen to undergo a regular series of changes, referable to the hydraulic and dynamic conditions of both, and which constitute the pathological state of a part, called *inflammation*.

Without entering into the details connected with this interesting subject, it will be sufficient for our present purpose to state that when inflammation has arrived at what Kaltenbrunner calls its *perfect state*, that is to say, when the capillaries are distended with blood which has ceased to circulate, that part from a deep red soon changes to a dark brown or black colour.

Cessation of the circulation, coagulation, and discoloration of the blood, are the successive changes which announce that the functions of the inflamed part are about to cease. The change of colour which takes place is found to depend chiefly on a corresponding and similar change induced in the blood contained in the vessel of the affected part, or that has been effused during the inflammatory excitement. Soon after the stagnation of the blood, the globules of this fluid are seen to unite, adhere to the internal surface of the vessels, and form a solid dark-coloured mass occupying their whole calibre. The sensibility of the part rapidly diminishes after the coagulation of the blood, although the nerves themselves are not observed to undergo any perceptible change. The coagulation of the blood is also followed by the cessation of absorption, for the most active poisons introduced into a part, the vessels of which are thus obliterated, either produce none of the effects which are peculiar to them, or do so very tardily and ineffectually, in which latter case they may have found their way beyond the obliterated vessels by imbibition. Under these modifications of function, after a certain length of time nutrition ceases in the affected part, the temperature of which sinks to that of external objects. Its consistence diminishes so soon as decomposition commences, and the colour which it assumes varies with the quantity and quality of the fluids it contains, and the chemical changes which these undergo from the action of the gaseous products of decomposition. Death or mortification of a portion of the body succeeding to inflammation, we therefore regard as an immediate consequence of cessation of the circulation, of which we have examples on a large scale, in ligature and spontaneous obliteration of the principal artery of a limb, unaccompanied by the establishment of a collateral circulation.

The state of the vessels, and of the blood which precede the physical signs of mortification, may be regarded as representing that state of a part which we call gangrene. The blood has ceased to circulate, it is even coagulated; the application of artificial stimuli to the neighbouring tissues, furnishes no evidence of their possessing sensibility or contractility. Yet, as under these circumstances we know that actual death may not have taken place, that the blood may resume its fluidity and circulate anew, and sensibility and contractility again return, the state to which we have alluded may properly be regarded as furnishing us with what may be called the anatomical and physiological characters of gangrene,—a state in which the functions of a part are suspended, analogous to that of the whole body in asphyxia, but not destroyed, whether we regard it as susceptible of recovery, or as an intermediate state which separates inflammation from mortification.

When the recovery of a part from the state of gangrene is about to commence, circulation becomes more active all round the circumference of the diseased part; the coagulated blood gradually disappears by the separation of its globules, and their transmission into the neighbouring currents;

absorption is manifested by the more or less rapid removal of the effused fluids, sensation and motion return, and the part is restored to the healthy state.

We have already enumerated the changes which mark the transition from gangrene to mortification. The separation of the dead part takes place within limits fixed by the state of the vascular system. Thus, the line of demarcation between the dead and the living parts does not extend beyond the obliterated vessels; for before adhesive inflammation has taken place, they are found obliterated to a greater or less distance beyond the mortified part. Their obliteration is not necessarily the consequence of the effusion of coagulable lymph. It depends on the plastic property of the blood contained within the vessels, which unites with their living membrane, becomes organized, and thus secures their permanent obliteration.

Obliteration of the blood-vessels, as the cause of mortification of the kind of which we are now treating, is a subject deserving of the most serious consideration both of the surgeon and physician. For it is to this state alone of the blood-vessels in the vicinity of the dead part that immunity from one of the most dangerous consequences of the disease, viz. hemorrhage, is to be ascribed. The presence of coagulable lymph, its organization and union with the parts into which it has been effused, constituting what is called adhesive inflammation, contributes no doubt to prevent hemorrhage during the process of separation of the dead part, or of sloughing. But we are disposed to believe that it is the prevention of hemorrhage from the smaller vessels only that is secured by the adhesive inflammation, while that from the larger ones is prevented by the previous coagulation of the blood contained within them. That it is to the coagulation of the blood in the large vessels of a limb that we must attribute the non-occurrence of hemorrhage after sloughing, is rendered still more obvious from what occurs in some cases of extensive and spreading gangrene, of the inferior extremity for example, and to arrest which it is found necessary to have recourse to amputation. The limb is removed, but the large blood-vessels yield little or no blood; they are, in fact, obliterated by firm coagula. There is no adhesive inflammation present in such cases, and gangrene and sphacelus succeed to the operation, because of the vessels not having been divided above the point at which they were obliterated.

Such is the state of the large blood-vessels which we have found to accompany sphacelus without hemorrhage. When, on the contrary, hemorrhage occurs in this stage of mortification, these vessels are found pervious, and filled with fluid or imperfectly coagulated blood; and the cellular and other tissues are more or less infiltrated with serosity, sero-sanguinolent, and puriform fluids.

Termination of Mortification. — We have already enumerated the most important and conspicuous local effects of mortification of tissues and organs, such as changes in colour, consistence, sensation, motion, temperature, and bulk, to which we might add those of form, in consequence of loss of substance of various extent.

The solution of continuity which follows the separation of the dead part may, if formed in the substance of a solid organ, be followed by ulceration, instead of being repaired by granulation or the organization of coagulable lymph; or it may be followed by perforation, if the solution of continuity takes place in the walls of a hollow organ, as the intestine, or on the surface of a solid organ, as the lungs, — a termination of sphacelus to which we formerly alluded.

When the dead part is separated, and the affected organ is seated internally, it may either be retained for an indefinite period, or it may be almost immediately expelled through the natural passages, such as the bronchi, trachea, intestines, &c. The dead substance is thus sometimes evacuated entire, as in the case of sloughing of a portion of intus-suscepted intestine, and in some rare cases of partial gangrene of the lungs. In parenchymatous organs, however, the dead portion is much more frequently broken down into shreds by a species of maceration in the surrounding fluids before it is ejected, and is then accompanied by a greater or less quantity of these fluids at the same time.

Signs and Symptoms of Mortification.—To determine the existence of mortification of an internal organ is, in the great majority of cases, beyond the power of the physician. The evidence which he is enabled to collect from the modifications which take place in the functions of the affected organ, from the state of some particular system or of the economy in general, is frequently far from being sufficient to warrant him in giving a decided opinion on the existence of this disease. Besides, the derangements of function to which it gives rise are, in some cases, either so slight as not to be recognised, or of such a kind as not to be distinguished from others produced by very different morbid states. Nor can we fix any determinate relation between the extent of the disease and the severity of its effects, such, at least, as are made manifest to us through the medium of functional derangement. These remarks apply equally to both stages of mortification, and to the kind and degree of inflammation by which they are preceded. With regard to the latter, it is well known that mortification, and that too of the lungs, may succeed to inflammation so slight as not to have induced a degree of indisposition sufficient to excite the attention of the patient, far less to induce him to apply for medical advice. In such cases it is sometimes not until sphacelus has taken place, when the presence of a cavity can be detected by means of the stethoscope, and the contaminating influence of the putrid fluids has already commenced, that the unfortunate patient sends for assistance, or finds his way to an hospital.

There are certainly no general symptoms which can be considered as the exclusive effects of either state of mortification. The violence and extent of the inflammation by which mortification may be preceded, may lead us to *fear* such a termination, but cannot enable us to *detect* it when it has occurred, even when those symptoms — sudden prostration and sinking of the powers of life — and to which so much importance has been attached, are present. Inflammation alone gives rise to these fatal symptoms in persons naturally

feeble, and in those in whom innervation and nutrition in general are so modified by previous excess or privation, as to give to diseases, the most insignificant in themselves, that peculiar assemblage of character generally known under the appellation of adynamia.

We have already enumerated, at the commencement of this article, the more common and obvious conditions of organs which, independently of the general conditions which we have just named, favour the production of mortification, when these organs are attacked with inflammation. We refer the reader to what we have said on this part of our subject, as furnishing additional evidence in favour of the opinion we have given regarding the difficulty of determining the existence of mortification by the manifestation of any particular modification of function of the organ in which it has taken place.

Although we reject, as a *sign* of mortification, the sudden occurrence of prostration and sinking of the powers of life in general, succeeding to inflammation, we must nevertheless regard these phenomena as of great and serious import in such cases, inasmuch as they indicate that the progress of the disease is not arrested, and that by means of absorption the system in general has been brought under the poisonous influence of the decomposed and putrid fluids of dead animal matter. These symptoms, which we attribute to the absorption of dead animal matter, are of course common to mortification from inflammation as well as from other causes.

The state of the pulse in persons affected with mortification of an internal organ is very various. If the previous inflammation has been slight, it may not have been much increased in strength or quickness, and may retain this state after the occurrence of sphacelus, and till near the period of dissolution, when it rapidly sinks, and becomes remarkably slow, feeble, and sometimes intermittent. If the inflammatory excitement accompanies the state of sphacelus, the pulse may continue quick, but it is feeble and easily compressed, and always sinks before death. The temperature of the skin is generally morbidly increased at the commencement, but becomes less than natural towards the termination of the disease, when the surface is often cold and covered with a clammy sweat. At the same time the tongue and teeth become covered with sordes, the breath frequently exhales a fetid odour, and there is occasionally singultus, low delirium, and picking of the bedclothes, or a state of stupor terminating in coma; the countenance assumes a cadaverous aspect, and the whole body as well as the evacuations, which are sometimes involuntary, give out the most offensive fumes, impregnated with the stench of dead and putrid animal matter. In this state the patient dies unconscious, and generally without a struggle. These, the general effects of the absorption of the putrid fluids of sphacelated tissues, are not always so conspicuous; nor do they proceed in all cases to a fatal termination with the same degree of rapidity. When they assume the aggravated form just described, life is seldom prolonged beyond the third, fifth, or seventh day. But when they are marked chiefly by a state of prostration, a quick, feverish, and feeble pulse, a hot skin, and an offensive smell of the secretions, the course of the disease may be prolonged to the second or third week, when it terminates as before described: it is only in this form of the disease that recovery has been known to take place.

The odour of gangrene, as it is commonly called, is perhaps the only pathognomonic sign of the existence of mortification. We have alluded several times to the presence of this odour in the breath of the patient and in the secreted and excreted fluids, as an almost constant sign of the contaminated state of the blood in the last stage of mortification. But the gangrenous odour to which we at present allude is that derived immediately from the affected organ, and which may, with few exceptions, be regarded as the only sign of the local existence of sphacelus to which we can attach a positive value. We need hardly remind the reader that it is not, however, present in every case of sphacelus;—that it is only either in those cases in which a communication exists naturally between the external surface of the body and the sphacelated tissue, or in those in which a preternatural communication has been established in consequence of the disease itself, and through which the putrid effluvia are discharged into natural canals, as in perforation of the bronchi and intestines from without inwards; or on the surface of the body, in perforation of the walls of the chest and abdomen in the opposite direction.

We have seldom an opportunity of detecting the putrid odour of sphacelus, unless when this disease occurs in the lungs, the digestive organs, the urinary organs in the male and female, and in the organs of generation in the latter. When present in the breath, it is necessary to discover its source, as it may have its origin in the mouth, pharynx, œsophagus, or stomach, or in the larynx, trachea, or lungs; this may be easily accomplished by submitting each of these portions of the digestive and respiratory apparatus to a separate examination. It may not be unimportant to observe that extensive sphacelus of the stomach, or rather of accidental tissues formed in this organ, may occur, without the eructations with which it is often accompanied, or even the fluids then ejected by vomiting having any the slightest degree of putrid odour: a circumstance which we attribute to the property which the gastric acid possesses of removing the tainted smell of animal substances.

Much importance is not to be attached to this character of sphacelus when perceived in the alvine evacuations. We have already stated that the excreted fluids acquire this particular odour in consequence of the absorption and the subsequent separation from the blood of the putrid animal matter; consequently the presence of this odour in the dejections may be entirely owing to the elimination of these fluids by the mucous membrane of the intestines from the blood. It may indeed be laid down as a rule, that unless this odour in the alvine evacuations be accompanied by the presence of portions of the intestine, or rather of the mucous membrane of the intestine, it cannot be regarded as a sign of sphacelus of this organ. It is chiefly in some forms of chronic dysentery that the odour of putrefaction

and the presence of sphacelated portions of the thickened mucous membrane are observed at the same time in the discharges which accompany that disease. An entire portion of intestine is never discharged unless in intus-susception followed by sphacelus. We shall have occasion to notice this morbid condition afterwards, under the subdivision of the present subject which treats of mortification in consequence of a mechanical obstacle to the return of the venous blood.

With regard to the putrid odour of sphacelus in the fluids discharged from the urinary organs and vagina, it is only necessary to observe that, in the former it always accompanies a turbid, bloody, or puriform state of the urine; and that, in the latter, there is present at the same time a sanious discharge, sometimes containing blood, and sloughs of the mucous and sub-mucous tissues.

The putrid odour is never so conspicuous as in sphacelus of the pulmonary tissue, and when a communication exists between the sphacelated substance and the bronchi. It is conveyed by the expectorated fluids, composed of those coming from the seat of the disease, as well as from the mucous membranes in general. These fluids are sometimes of a dirty grey, brown, or green colour; puriform or sanious; containing sometimes shreds or small portions of the sphacelated lung; and are occasionally streaked with blood. If hemorrhage has taken place, blood alone may be expectorated in greater or less quantity. In sphacelus of this organ, too, there are various physical signs which, with those already mentioned, and particularly the latter, enable us to detect not only the existence of this state, but also its situation and extent, the state of the surrounding pulmonary tissue, and the mode in which the disease has terminated,—circumstances of greater or less importance as regards the prognosis and treatment.

The most important of these physical signs are the following; but we must observe that they are confined to the second stage of mortification, or sphacelus, and that those of the first stage, or gangrene, are in no respect different from those of pneumonia:—so soon as sphacelus has taken place, a loud crepitous rattle is produced, which gradually assumes a gurgling sound, as the quantity of fluids increase, and the sphacelated tissues become separated from the surrounding pulmonary substance, or broken down. The cavernous rattle continues for an indefinite time, and is replaced by pectoriloquism when the contents of the excavation are partially or wholly removed. The resonance of the voice is remarkably distinct and strong in excavations of this kind, particularly when large, and may, according to Laennec, be distinguished from that which accompanies abscess of the lung, from its having nothing of that *floating* kind of sound of the latter, and is rarely accompanied by the *veiled puff*, so common in the abscess.

When the sphacelus extends to the pleura, and the dead portion is separated, thus establishing a communication between the cavity of the chest and that formed in the substance of the lung, we have, besides the signs already enumerated, those of pleurisy and pneumothorax combined with liquid effusion. If at the same time a communication exists between the bronchi and the excavation, there is heard either the *metallic tinkling* or the *utricular resonance*. The crepitating rattle of pneumonia, which is sometimes heard previous to the occurrence of sphacelus, may continue after the occurrence of it, and may, in some measure, serve to indicate the progress of the disease towards a fatal termination. We have never but once had an opportunity of hearing the crepitating rattle where it indicated the return of the pulmonary tissue to the healthy state. The excavation occupied two-thirds of the inferior lobe of the left lung, and the resolution of the disease was indicated, not only by the state of the pulmonary tissue around the excavation, which was crepitant, and did not contain more blood than usual, but likewise by the presence of an organized false membrane, which lined the internal surface of the excavation, a means which, as noticed first by Laennec, seems sometimes to be employed by nature to limit the progress of mortification.

We must again repeat, that with all these signs our diagnosis can never acquire a positive degree of certitude, unless they are accompanied by the putrid odour of sphacelus.

We have already said that the progress of mortification, although in general more or less rapid, is sometimes slow. Laennec speaks of it as existing in a chronic form in the lungs. It is then accompanied with hectic fever, sometimes considerable, but generally less intense than in most cases of phthisis; the skin feels hot, sometimes even disagreeably so, to the hand; and the expectoration and breath are fetid. This state is accompanied by rapid emaciation, and the disease may be readily mistaken for phthisis; more commonly, however, death supervenes before emaciation has made much progress, the disease appearing to have a greater tendency to produce cachexia than marasmus.

We regard the cure of mortification of the lungs as an exception to the rule, and we have certainly not witnessed this fortunate termination of the disease, except in two or three instances, in which it was not very extensive. In these cases, too, the progress of the disease was limited at an early period, no doubt by the obliteration of the blood-vessels, and adhesive inflammation. That such was the state of the pulmonary tissue around the excavations which were found to exist in these cases, we feel convinced, not only from the disease being stationary from the commencement, but from the general secondary symptoms of mortification, viz., those produced by the absorption of the putrid fluids, not having manifested themselves during the course of the disease. It is, however, stated by Laennec, that he has known several patients recover, who, judging from the extent of the pectoriloquism, had gangrenous excavations of great size. In one of those patients there was sloughing of the pleura as well as of the pulmonary tissue, giving rise to a pleurisy, which was not cured till after a period of fifteen months.

Prognosis of Mortification.—The prognosis of this disease, in the last stage, is always unfavourable, because, on the one hand, of its being accompanied by a loss of substance, and on the other because of the affected organ, or the constitution in general, being frequently in a situation

which the resources of our art can neither remedy nor relieve. Our prognosis will, of course, be greatly modified by the circumstances of each case; the extent of the disease, its seat, the state of the affected organ previous to its occurrence, the age and constitution of the patient, and the situation in which he was placed previous to the attack. In all cases in which we can determine that the progress of the disease has been arrested, will our prognosis be the more favourable; but in those in which the secondary symptoms which we have several times brought under the notice of the reader, are present, the death of the patient may be regarded as inevitable.

Treatment of Mortification.—The treatment of mortification from inflammation must be conducted in reference, 1st, to the cause of the disease; 2d, to the disease itself; and, 3d, to its effects, mediate or immediate. With regard to the first head, the efficacy of the means employed will depend much on the extent and degree of the inflammation which accompanies the stage of gangrene or sphacelus, the nature of the affected organ, and the general condition and age of the patient. The progress of the inflammation may be arrested, or its violence moderated, by the prompt and well-regulated use of antiphlogistic remedies, such as general and local bloodletting, saline purgatives, rest, quiet, and total abstinence from food. In those cases in which the inflammatory symptoms have been slight, even from the commencement of the disease, the antiphlogistic treatment has been found to be injurious rather than beneficial, both on account of the debility which is present, and because of its having appeared to retard or prevent the accomplishment of that salutary process by means of which the progress of the disease is arrested. There are other cases in which the use of antiphlogistic remedies is forbidden, by the nature both of the general and local symptoms. There is a total absence of pain, no sign of inflammation in the affected organ, and a state of general debility or prostration. The early occurrence of these symptoms, as well as their presence in the last stage of almost every case of mortification, have rendered many physicians very cautious in the use of debilitating remedies, and have induced them to place more reliance on the judicious employment of tonics and stimuli, and other means calculated to support the strength of the patient, and assist nature in carrying on the process of elimination and reparation. It is only by a knowledge of the circumstances of each case that we can at all judge of the applicability of either mode of treatment, or when the one should be employed in preference to the other. It is on the same principles that we can reasonably hope to exercise a salutary influence over the disease itself, that is, as regards the removal of the dead portion, and preventing the effects to which it gives rise. The most dangerous of all the effects of mortification are those which follow the absorption of the putrid fluids of the sphacelated tissues, to remove or even mitigate which no means have yet been devised on which any reliance can be placed. It has been proposed to employ solutions of the chlorides of lime and soda, as washes, to destroy the putrid effluvia which accompany sphacelus. We are not certain how far they have been found to accomplish the end in view. Besides, these solutions can be had recourse to only in a very limited number of cases of this disease, and when confined to the organs of generation and the urinary bladder.

II. Mortification from a mechanical obstacle to the circulation of the blood.—The blood may be prevented from arriving at, or returning from, a part of the body by mere mechanical causes. In both cases mortification is the consequence of the cessation of the function of nutrition, either from a deficiency of the arterial or the stagnation of the venous blood. A deficiency of the arterial blood may be occasioned by ligature of the principal artery of a limb, a collateral circulation sufficient for the nutrition of the limb not having been formed; or it may follow in consequence of coagulated blood, or fibrine, organized or unorganized, occupying the entire calibre of such an artery or its principal branches, from ossification of the walls of these vessels, or their conversion into a solid fibrous or ligamentous tissue.

Stagnation of the venous blood may depend on obliteration of the veins caused by the pressure of tumours situated in their immediate vicinity; accidental products formed in their cellular sheath; or the presence of fibrine or other solid substances derived therefrom, formed within the veins, and either simply lodged within them, or more or less intimately connected with their lining membrane; and, lastly, diseases of the heart, which greatly obstruct or prevent the return of the venous blood to this organ. Mortification may also occur in consequence of the arteries, veins, and nerves having all at the same time been submitted to severe pressure, as in the case of ligature and tumours.

Mortification from a mechanical obstacle to the circulation of the blood is by no means equally frequent, either as regards the causes we have just named, or the part of the body in which it occurs. Mortification in consequence of the stagnation of the venous blood is much more often seen than that which follows an obstacle to the arterial circulation, owing obviously to a difference in the organization and relations of the arterial and venous systems, whereby the latter is more frequently and more easily subjected to the influence of mechanical agents, capable of modifying, in the manner alluded to, the circulation of the blood. Mechanical causes which compress or obliterate the veins are often incapable of producing the same effects on the arteries, from the circulation in the former tending to favour rather than oppose their operation, and which in the latter has a powerful influence in resisting every external force which tends to diminish their capacity. And besides, stagnation of the blood in the venous system, by whatever cause produced, may, correctly speaking, be said to depend on the relation which exists between it and the arterial system; that is to say, the mechanical cause is but an obstacle to the passage of the venous blood, while the quantity of this fluid and the extent of the stagnation that follows are determined by the arterial system.

The situation of parts and the mode in which their circulation is affected, are circumstances which modify in a remarkable manner the fre-

quency of mortification. Mortification from mechanical causes which obstruct the circulation of the blood, occurs in the great majority of cases in the extremities, and far more frequently in the inferior than in the superior, partly from their being isolated from other organs which might facilitate the formation of a collateral circulation, and partly from their situation and position, both of which are unfavourable to the circulation of the blood. Mechanical causes, which produce general death when situated in organs on the integrity of whose functions life in general more or less immediately depends, give rise in them only to local death or mortification. In the former the operation of these causes is necessarily of short duration, and is always confined within narrow limits when it is carried to a degree to produce *sphacelus*. Should their influence extend to the circulation of the whole of an organ, such as the lungs or liver, the obstacle to the return of the blood from either being situated in the heart, a state of general congestion is produced, but which never amounts to what is properly called gangrene.

In the latter, on the contrary, mechanical causes which impede or interrupt the circulation of the arterial and venous blood, may continue to operate for a considerable length of time, producing all the regular stages of mortification, as various degrees of congestion, gangrene, and sphacelus. Mortification, however, does occur in the extremities without being preceded by these changes, the reason of which we shall endeavour to assign presently.

With regard to the relative frequency of mortification of the kind of which we are now treating, it is also of importance to know that this disease is more frequently produced by disease of the heart than of the blood-vessels, and that in this case it is never observed in any other part of the body than the inferior extremities. There are, however, several circumstances, to which we shall particularly allude hereafter, which hasten the termination of congestion of these parts from disease of the heart, in gangrene and sphacelus, and without which such a termination would not unfrequently not take place.

From these general remarks on the influence of mechanical causes, operating through the medium of the circulation, in the production of mortification, and the comparative frequency of this disease in different parts of the body, it is obvious that the descriptive characters of this disease so produced must be founded on the phenomena which it presents when it affects external organs. We shall therefore commence with the description of that form of the disease which occurs most frequently, and which affects the inferior extremities in consequence of an obstacle to the return of the venous blood from these parts, produced by disease of the heart.

1. Mortification of the inferior extremities from disease of the heart. — The first local sign that an obstacle exists to the return of the venous blood from the inferior extremities is manifested by the appearance of slight œdema around the ankles. The serosity gradually accumulates in those parts, spreading thence throughout the cellular tissue beneath the skin and between the muscles; the feet, and afterwards the legs, thighs, and scrotum in the male, and labia pudendi in the female, become swollen; the skin assumes a smooth and glossy aspect, feels tense, and sinks into the cellular tissue when pressed, and does not resume its former shape and situation till raised by the return of the serosity beneath it. The colour of the skin, at first natural, becomes pale and waxy, and may continue in this state during the greater part of the course of the disease. When discoloration of the skin is about to take place, it is seen to depend on the presence of a few subcutaneous veins, which gradually increase in bulk and number, coalesce in several points, and communicate a slightly mottled aspect to the skin, of a dull red or purple colour. On one or more of these points where the congestion is greatest, and where the skin is less yielding, as over the tibia and above the malleoli, phlyctenæ or large bullæ are formed by the effusion of serosity, either alone or mixed with blood, under the cuticle. When these burst, the cutis beneath presents a dark red or brown colour, and very soon is converted into a dirty yellow or ash-grey slough. The separation of the slough is sometimes preceded by an increase of redness in the surrounding cutis, which, from its anatomical characters and the increased temperature and pain by which it is accompanied, is obviously of an inflammatory nature. At other times the redness which precedes or accompanies the separation of the dead part is very slight, and is evidently owing to mere venous congestion, occasioned not only by the disease of the heart, but also by the serosity accumulated in the cellular tissue of the limb, which, from the pressure it occasions, further retards the return of the venous blood, and aggravates all the symptoms produced by the primary cause of the disease.

Although, after the separation of the slough, a loss of substance of considerable extent in depth may appear to have been produced, it perhaps never proceeds beyond the cellular tissue; and it is because of this tissue being greatly distended with serosity, that the loss of substance which follows sloughing appears to have penetrated deeply into the substance of the limb.

Congestion, gangrene, and sphacelus may take place on several parts of the leg, but they are in general limited to the parts we have enumerated, and rarely occur on the feet or toes.

We have already remarked that the temperature of the extremities is always below the natural standard during the first periods of the disease, and that it does not acquire a morbid increase till the distension of the cutis is great, and this tissue becomes discoloured from the congested state of the capillaries. An increase of the sensibility takes place at the same time, and is always greatest where the cutis is most distended, and sometimes amounts to a degree of pain of a darting, pungent, or burning character, which greatly increases the sufferings of the patient. Although the temperature and sensibility of the limb are sometimes very great while the cutis is still entire, but tense, congested, or inflamed, they are never so considerable as when sloughing has taken place, accompanied by inflammation of this tissue. It is also in such cases that the pulse becomes

quick and the skin in general hot;—in one word, that febrile symptoms make their appearance. Under these circumstances life is seldom prolonged beyond a few days, otherwise the death of the whole limb would follow as the inevitable consequence of the increased disturbance of the circulation, occasioned by the febrile excitement;—a termination which the author of this paper has witnessed in two cases, in one of which the sphacelus extended even to the walls of the abdomen.

The progress of this kind of mortification, although generally slow, is occasionally very rapid. This difference depends chiefly on the two following circumstances,—a naturally unyielding state of the skin, and the effect produced on the venous circulation of the limb by the effused serosity. It is principally to the latter circumstance that we wish to direct attention, as it may suggest some means to prevent its occurrence and the evils by which it is followed. As soon as the blood has accumulated to a certain extent in the venous system of the inferior extremities, serosity is effused in greater or less quantity, and compresses the veins. A second obstacle is thus created to the return of the venous blood, and consequently the progress and termination of the disease are greatly accelerated. These effects of compression from the effused serosity are first manifested by the sudden appearance of congestion of the skin, which generally occupies the greater part of the leg. The skin retains its glossy aspect, but becomes all over mottled with various shades of red and purple; is seen traversed in every direction by minute veins and capillaries distended with blood, and the whole limb acquires a degree of hardness peculiar to this state of the circulation. The sloughing which follows may take place without the supervention of inflammation,—at least without this state being marked by uniform redness of the skin,—is more extensive than in the previous form of mortification, but does not extend beyond the skin and cellular tissue.

The separation of the sloughs in mortification from disease of the heart is seldom followed by hemorrhage; and when it does occur, it consists merely in a slight oozing of blood from one or more points of the denuded surface. This circumstance, as well as the state of the blood generally found in the veins after death, is readily accounted for. The blood in the veins in the immediate vicinity of the sphacelated part of the limb, is found coagulated, or these vessels are filled with fibrine. More remote from this part, and sometimes in the greater part of the limb, the blood with which they are distended is also more or less coagulated, but becomes more fluid as we examine it further from the seat of the sphacelus.

Prognosis.—In no disease can our prognosis be more certainly fatal than in mortification in consequence of disease of the heart. Its very occurrence is a sure evidence that the disease on which it depends would soon terminate fatally without the aggravation of suffering which this, perhaps the worst of its effects, never fails to produce. The only favourable circumstance—if such it can be called—relates to the duration of the disease. If the mortification is the consequence of the stagnation of the blood occasioned by the disease of the heart alone, we may venture to predict that its progress towards a fatal termination will be slower than when to this, the primary cause, is added the obstructing influence of the effused serosity.

Treatment.—The treatment of mortification from disease of the heart is not only extremely restricted but entirely palliative. The general treatment which has been or is still employed against the primary disease, and which has been found ineffectual in arresting its progress, is also that which, if no such disease existed, would be adopted for the cure of the mortification. Under such circumstances experience has shown that little more can be done for the patient than to mitigate his sufferings by the frequent administration of anodynes; the application of cold lotions, warm fomentations or poultices to the affected limb; using one or other of these as the feelings of the patient or the stage of the disease may suggest. Both on account of the patient and the assistants, a solution of the chlorides should be used so soon as sloughing has taken place. The limb should also be kept in an elevated position by means of pillows; and as the foot is often cold while the leg is painfully hot, some relief is obtained by covering the former with warm flannel, and the latter with compresses that have been dipped in cold water or the saturnine lotion. It is probable that the occurrence of mortification from disease of the heart might in some cases be prevented by the early confinement of the patient to the horizontal position, by the occasional use of friction with a view to facilitate the venous circulation of the extremities, and the application of a well-adjusted bandage from the toes upwards, which would not only prevent the occurrence of great congestion by equalizing the circulation throughout the limb, but also the œdema which follows, and so greatly aggravates the disease.

2. Mortification of internal organs from a mechanical obstacle to the return of the venous blood.—We do not believe that there is a single example of mortification of an entire internal organ from an obstacle to the return of the venous blood, and produced by a mechanical cause. We have already stated the reason of this exception, namely, the facilities afforded for the formation of a collateral venous circulation; and the duration of the mechanical cause capable of producing local death being limited by the greater importance of these organs. Mortification of portions of internal organs is, however, occasionally met with, and which can easily be traced to cessation of the circulation from compression of the veins: the lungs, liver, and intestines are the organs in which this form of mortification is most conspicuous. It occurs in the lungs when the cellular structure of these organs has become consolidated by the deposition of coagulable lymph, and produces that state of the pulmonary tissue termed *hepatization*. We allude here to the *grey* hepatization most frequently observed around tubercular excavations, and which is regarded as the consequence of chronic pneumonia. The colour of the indurated pulmonary substance may be grey, purple, livid, or nearly black, and its consistence sometimes such as to equal that of cartilage. In this state it is highly probable that

it never regains its natural structure and consistence. When carefully dissected, not only are the veins contained within it found compressed or obliterated, but also the arteries are much diminished in bulk. In fact, all the elementary tissues of the indurated portion of lung are atrophiated; and if the accidental deposit by which these changes are produced is not removed by absorption, the former are soon deprived of their vitality, and both are converted into a soft substance, the colour of which will depend on that of the part previous to this change, as well as the degree of putrefaction which it may have undergone before it can be examined.

Sphacelus of the walls of tubercular excavations is sometimes produced in a similar manner. The veins and arteries which traverse the septa, or ramify in the walls of these excavations, become obliterated by the conversion of the blood which they contain into masses of firm fibrine. This change may take place previously or subsequently to the formation of the excavations. In the former case the expectoration is copious, sometimes contains pretty large portions of tuberculous matter and softened cellular substance, the odour of which is extremely offensive. In the latter case the only change observed in the expectoration is a tinge of brown, dirty grey, or green, with perhaps a more marked odour of sphacelus.

Induration of the pulmonary tissue and compression of the veins may likewise be produced by the tuberculous matter, when deposited in such quantity as to occupy a large portion or the whole of the lobe of the lung. The author of this article has represented a striking example of induration from infiltration, as it is called, of tuberculous matter terminating in sphacelus, in the first Fasciculus of his work on the "Elementary Forms of Disease." The whole of the upper lobe of the right lung was converted into a solid mass as firm as a piece of boiled cow's-udder, of a pale straw colour, of a homogeneous aspect, and presenting here and there only a few faint traces of the interlobular sections. The upper portion of this lobe contrasted strongly with what we have just described. It was converted into a mass of dirty yellowish grey substance as large as an orange, some parts of it soft and spongy, others quite pulpy or consisting of a dirty grey sanies, in which the blood-vessels, veins, and arteries, were lying denuded and obliterated by firm coagula. There was no increase of vascularity, indicative of previous inflammation, in the infiltrated pulmonary substance, around this the sphacelated portion; and therefore we regard this case as strikingly illustrative of the manner in which local death is not unfrequently produced by the accumulation of accidental products of the parenchyma of organs.

When speaking of mortification of the lungs from inflammation, we alluded to the occasional occurrence of this disease without it, being preceded by the usual phenomena of pneumonia. Although we are not prepared to demonstrate that such cases should be considered as of the same nature as those we have included under the present head, we are satisfied that we have seen one or two instances of sphacelus of the pulmonary tissue depending on induration as a consequence of chronic pneumonia. This opinion is founded not only on the sudden occurrence of the state of sphacelus without the signs or symptoms of previous inflammation, but on the presence of grey indurated pulmonary tissue, which we found forming part of the boundary of that which was sphacelated: such a degree of induration could not have been produced by adhesive inflammation, subsequent to the sphacelus, as death took place within too short a space of time to allow of such being accomplished.

Sphacelus of portions of the liver is not very rare in those cases in which it is nearly filled with cancerous tumours. These tumours produce, mechanically, extensive obliteration of the veins; and when a portion of the liver becomes incarcerated by them, it is converted into a dark brown slough, generally soaked with blood, and sometimes mixed with softened and detached portions of the neighbouring tumours.

An obstacle to the venous circulation gives rise more frequently to sphacelus in the digestive organs than in the liver. It is chiefly in the intestines that cessation of the circulation from a mechanical cause is seen to terminate in sphacelus: we shall adduce one example only of sphacelus, namely, that which occurs in the intestines in the case of intus-susception.

We shall allude shortly to the mechanism of this morbid condition of the intestine, in order that the cause of the sphacelus, in which it sometimes terminates, may be clearly understood. When the superior portion of intestine passes into the inferior, or becomes invaginated, it carries along with it that part of the mesentery to which it is attached. If it does not suffer much compression, the invaginating process may go on to a great extent; but if it is compressed to such a degree that the return of the venous blood is obstructed, this stage of the disease is arrested, on account of the congestion which follows of all the coats of the invaginated portion. The congestion is not the consequence of inflammation; it is produced by pressure, and in the following manner: when the mesentery is put on the stretch by the descent of the superior into the inferior portion of the intestine, the veins belonging to it are compressed between the walls of both portions, just at the point where the invagination terminates superiorly. If adhesive inflammation takes place at this point, the peritoneal surfaces of both portions become united, and the veins obliterated. As the arteries are much less affected by pressure than the veins, they continue to pour their blood into the invaginated portion; this fluid gradually accumulates, and produces an extreme degree of congestion of the mucous and submucous coats, giving to them a deep red or almost black colour. In this state, however, the intestine is not deprived of its vitality. It is in a state of gangrene, but not of sphacelus; for its structure is still entire, and when it has been separated and evacuated, presents, after having been macerated for some time, so as to deprive it of the blood which it contains, the most perfect state of integrity of all its tunics. Occasionally, however, a portion or the whole of the invaginated intestine is found in a state of com-

plete sphacelus, and is passed in the form of irregular spongy masses or shreds of a dirty ash-grey, brown, or black colour.

It is not unimportant to know that the invaginated intestine may be detached in separate portions, and passed at different intervals of time. In such a case the physician might be led to suppose that there were several distinct portions of intestine invaginated, whereas there is only one portion. If the invaginated portion of intestine be considerable, it is, perhaps, never separated all at once; on the contrary, it is detached, as we have said, in several distinct portions, two, three, five, or even eight; differences which depend on the manner in which the invaginated intestine is disposed of. For if considerable, it does not present a cylindrical form; it is drawn up into the form of abrupt, flattened, or angular coils, determined by the attachment of the vessels and mesentery, so that stagnation of the blood takes place successively in different points, and from below upwards, being always greatest at the inferior extremity of the invaginated portion.

The symptoms of intus-susception derive no peculiarity from the existence of gangrene or sphacelus, unless when a part or the whole of the invaginated portion is passed by stool. We may, however, observe that this disease may, in the great majority of cases, be distinguished from stricture of the intestines occurring after ulceration, by a careful examination of the previous history of the patient. Disorder of the functions of the digestive organs, referable to chronic disease of the intestinal canal, will be found to have existed for a greater or less length of time before the occurrence of those symptoms which indicate an obstacle to the passage of the food or fæces from stricture: these symptoms are but slight at first, repeated at irregular intervals of time, and become more aggravated at every succeeding attack; whereas in intus-susception the presence of a mechanical obstacle is announced suddenly without being necessarily preceded by any marked derangement of the functions of the intestine; the symptoms to which it gives rise are rapid in their course, steady in the increase of their severity, and are aggravated by all the internal remedies calculated to relieve or remove the former.

There are no means of distinguishing this disease from internal strangulation of the intestine until the sphacelated portion is passed by stool. The existence of the former disease may, perhaps, be suspected previous to this period by the oozing of blood from the congested mucous membrane of the invaginated intestine.

The natural cure of intus-susception furnishes us with the most interesting examples of the efficient good which can be accomplished by adhesive inflammation. The serous membranes being endowed with a property which enables them to supply a quantity of coagulable lymph sufficient for the full accomplishment of this process, by the lowest possible degree of inflammation, the solution of continuity which follows the separation of the dead portion of the intestine is often repaired without any appreciable disturbance of the economy. The union of the intestine, let it be remarked, is effected, not between a mucous and serous surface, but between the *two serous surfaces* of the invaginated and invaginating portions of the intestine, and just at the point where the invagination commences: there the separation takes place, and there also the union is effected previous to the separation, which is to maintain the continuity of the intestine, and secure the life of the patient. Under these circumstances the diameter of the intestine may not undergo any perceptible change, and the passage of the food or fæces is accomplished with the same facility as before the occurrence of the disease.

It is consolatory to know that patients may survive the loss of a considerable extent of intestine from intus-susception, and that, too, without their general health having suffered any perceptible alteration. By far the most remarkable instance of this kind that has come to the knowledge of the writer of the present article, occurred in the practice of his excellent and distinguished friend, Dr. Forbes, of Chichester, with whom he had the opportunity of examining several of the portions of intestine passed by the patient. There was no less than *eight* portions of intestine passed by stool, varying from eleven to thirty-two inches in length, the length of the whole amounting to *twelve feet of entire intestine!* Each portion was complete in itself, presenting, in fact, the appearance of healthy intestine, that has been allowed to remain for a certain length of time in alcohol. They consisted of the jejunum and ileum, some of them having their serous, others their mucous surface outwards (which is always the case when the intus-suscepted intestine separates in distinct portions), on the former of which the blood-vessels, on the latter the glandulæ agminatæ, were most conspicuously visible. The most interesting feature of this case was the complete recovery of the patient, at least from the immediate consequence of this disease. The subject of this remarkable case was a poor woman of the name of Ann Newland, resident at Emsworth, in Hampshire, and was a patient of Mr. Lyne, surgeon at that place. She had been confined to bed by an anomalous chronic affection for many years previously to the intus-susception. The first portion of intestine came away in the year 1826, the last in 1829. She died in March, 1831, aged thirty-seven years. The greater part of the intestine passed, is preserved in the Museum of the Chichester Infirmary.

This case also acquires great additional value from the circumstance that the form and dimensions of the intestine, at the point where the solution of continuity had taken place, were found, after the death of the patient, to have undergone very little alteration. A slight contraction of the small intestine, and the presence of a thin, pearly-coloured false membrane, little more than half an inch in breadth, and surrounding it in the form of a zone, were the only external appearances which indicated the original seat of the disease. On the corresponding and internal surfaces of the intestine there was also seen a narrow, slightly elevated, smooth ridge, covered by mucous tissue, and traversing the whole circumference of the intestine, the walls of which, opposite, were considerably thickened.

If any doubt could remain that these appearances were to be admitted as positive evidence of

the union and cicatrization of the original solution of continuity of the intestine, that doubt would be entirely removed by the fact that the solution of continuity had taken place in the situation of one of the glands of Peyer, and in such a manner that this gland was divided into two nearly equal portions, one of them terminating in the cicatrix, and the other being situated at the extremity of one of the detached portions of intestine.

With regard to the treatment of mortification from intus-susception, there are two points which deserve the chief consideration of the physician; the reduction of the invagination, and the separation of the dead portion of intestine. The reduction of the invagination is not to be effected by the *direct* operation of any means which we have in our power to employ. If this is at all to be accomplished, it must be by preventing the accumulation, or diminishing as much as possible the quantity of the fluid contents of the intestine, —that is to say, by confining the patient to a state of absolute rest, by depriving him of food and drink as long as possible, by general blood-letting, and the use of emetics so employed as not to act upon the intestine. Purgatives must be avoided, as having the direct effect of increasing the disease. If this treatment fails to give relief, the physician should act as if there were a certainty that the reduction of the invagination is rendered impossible by the adhesive inflammation, and that a cure may be expected to follow the separation of the dead part of the intestine. Under these circumstances he must wait patiently, and endeavour to remove every cause which can tend to retard or prevent the accomplishment of this salutary result. At this period of the disease he cannot do better than enjoin rest and quiet, and support the strength of the patient by the frequent administration of small quantities of nutritious fluids, or enemata of a similar kind.

Numerous examples of mortification from an obstacle to the venous circulation are met with in those adventitious formations known under the denominations of scirrhus, cancer, medullary sarcoma, fungus hematodes, fibrous tumours, &c. We do not, however, think it necessary to do more than indicate the occurrence of the disease in such cases, as we have already alluded to it when speaking of mortification of the lungs and liver produced by a mechanical obstacle to the return of the venous blood. Such adventitious products, from their situation, connection, and mode of development, are often destroyed in part, and sometimes entirely, solely on account of the veins in their immediate neighbourhood, or contained within them, being so compressed as to prevent the passage of the blood through them. These substances become gorged with blood, particularly at their circumference, where sloughing commences, which proceeds towards their interior, with a rapidity and extent proportioned to the degree of congestion by which it is preceded.

The rapid development of some of these accidental formations often depends on the destruction of the surrounding tissues by mortification, whereby they are relieved from the restraint imposed on them by external pressure. They now shoot forth with surprising rapidity, and undergo such a change in their conformation and other physical characters, that, although still the same disease, they are no longer recognised as such, and receive new names, which not a little embarrass the student of pathology.

3. **Mortification from obliteration of the Arteries.**—Although this form of mortification, confined as it is almost always to the extremities, be regarded as the exclusive object of surgical treatment, we shall give a small outline of the pathology as it occurs in two distinct morbid states of the arteries of these parts, that the physician may be the better prepared to distinguish it from that which arises from disease of the heart, and another form of mortification of the extremities which still remains for us to describe,—viz. that occasioned by the use of unsound rye as an article of food.

The two forms of mortification of the extremities to which we here allude, originate, the one in spontaneous rupture of the internal and middle coats of the trunk of an artery, the other in the obliteration of a similar vessel or of its principal branches by the presence of organized fibrine, fibrous or osseous substances.

Mr. J. W. Turner, professor of surgery in the University of Edinburgh, was the first who directed the attention of the pathologist to the occurrence of spontaneous rupture of the internal and middle coats of an artery. There is, however, nothing in the histories of the cases which he has published which throws any light on the morbid condition of the arteries which precedes the rupture of their internal and middle coats. That such must have been the case is obvious from the following facts. One of the patients, whose case is related by Professor Turner, was in the act of raising himself in bed by resting on the palms of his hands, when he experienced a sensation as if something had given way at the joint of the right arm. Five days afterwards, the same patient, while in the act of moving his right leg, perceived a sudden sensation of numbness and weight extending from the ham downwards. Another patient, while turning his hand behind his back to put in his coat-pocket, felt a sudden acute pain in the bend of the elbow joint, and a sensation of numbness in the hand and fore-arm. It is, therefore, obvious that in none of these cases the rupture, which was afterwards found to have taken place in the internal and middle coats of the brachial and popliteal arteries, could have been produced had there not existed a previous state of disease of these vessels. In one of the cases only did mortification take place. Half an hour after the rupture of the popliteal artery, no pulsation could be felt in any of the arteries of the foot, or in the ham. The foot was cold: no pain was excited by pressure on any part of the limb, but the patient complained of occasional cramp-like pains in the calf of the leg. The morning after the attack the foot was pale and cold, and below the ankle the integuments were entirely void of sensation when pressed, pinched, or tickled, and the muscles of the foot seemed to have lost the power of contraction. The next day several mottled purple patches appeared on the instep and fore-part of the ankle, which gradually extended over the whole foot, till the surface, by the fifth day, became entirely livid. As the discoloration

advanced, the foot swelled slightly, and became œdematous, and appeared to acquire an increase of temperature. Soon after the attack the patient complained of severe burning pain in the foot, and a feeling as if it were crushed, which continued till near his death. About the ninth day the soft parts above the ankle began to swell and to be hot and painful on pressure; the swelling gradually increased, and extended till it reached the upper part of the calf of the leg. The integuments above the ankle began to become discoloured at the same time, and the discoloration increased till the lividity reached the calf of the leg, and at last rapidly extended nearly to the knee. The soft parts adjoining the discoloured skin were swollen and very painful on pressure; but no redness appeared, nor any inflammatory line between the dead and living parts. The parts discoloured were completely sensible, and the cuticle raised into globular vesications, filled with limpid or reddish serosity. The constitutional symptoms in this case were greatly aggravated by a previous state of disease. Death, however, did not take place till eighteen days after the pulse had ceased in the leg. The coats of the artery were found torn, thickened, and obliterated in several points by coagulated blood, fibrine, and lymph.*

The second form of obliteration of the arteries which gives rise to mortification, consists, as we have said, in the presence of fibrine, fibrous, or bony substances formed in these vessels. When the quantity of these substances is such as to interrupt or prevent entirely the circulation of the blood through the principal arterial trunk or branches of one of the inferior extremities, mortification is almost always the consequence, because of the advanced period of life at which this form of the disease generally occurs, and the very unfavourable state of the arteries to the formation of a collateral circulation.

It is to this form of mortification that we would confine the term **gangræna senilis**; the *idiopathic* and *dry* gangrene of authors.

We have already stated one of the reasons which have induced us to give a general outline of the kind of mortification which we are now describing, and we might have added a still more weighty reason for our doing so; viz., the important pathological evidence with which it furnishes us in regard to the production of mortification, independently of the previous existence of local inflammation; a subject on which it would appear some doubt is still entertained. We should not have thought it necessary to recur to this circumstance, having already shown that mortification, from a mechanical obstacle to the return of the venous blood, and produced in a variety of ways, is not an uncommon occurrence in internal organs, were it not that the facts then adduced might be regarded as incomplete, from their being chiefly founded on the results of post-mortem examinations. In the form of mortification which we are now about to describe, no such objection can be raised, as all the facts which the pathology of a disease can afford as evidence of its seat and nature, are, in this case, equally conspicuous and decisive.

The first change which announces the occurrence of local death from obliteration of the arteries of one of the inferior extremities, occasioned by the presence of the accidental products which we have named, is a dark-red, purple, or almost black discoloration of the skin of the fleshy or under portion of one or more of the toes of the foot. There is, in general, no previous swelling of the affected toes, no increase of their temperature or sensibility. The discoloration, alone, is often the first circumstance which attracts the attention of the patient to the existence of the disease; and we have seen two cases in which the discoloration had gained the upper surface of the toes, before the patients were aware of the presence of this insidious and fatal affection. In some cases, however, a prickling or tingling sensation, or a certain degree of numbness and cold, are perceived in one or more of the toes, and which, when examined, are already found to be discoloured; not red, hot, swollen, and painful, but of a purple or livid colour, colder than natural, not painful when pressed, and shrunk rather than increased in bulk. An increase of temperature, sensibility, and bulk of the affected toes, is, however, occasionally observed at or near the commencement of the disease; but as they are not constant, so are they not necessary changes. This, the first period of the disease, presents, indeed, none of the local characters of inflammation, if we except the circumscribed accumulation of blood on which the discoloration of the skin of the toes depends, the isolated existence of which is, however, of no value, inasmuch as its presence can be accounted for from interruption to the arterial circulation of the limb.

The discoloration extends slowly until it has pervaded the whole of the skin covering the toes, then proceeds upwards over the back and sides of the foot, and sometimes mounts nearly as far as the knee, although more frequently death takes place from the constitutional disturbance which ensues, before it has passed the foot or ankle joint. During its progress, the discoloration generally presents the same purple or livid tint which it did at the commencement; and although it may be preceded by some swelling and congestion of the skin and subcellular tissue, its progress is seldom marked by the bright red colour of inflammation; and when inflammatory redness of the skin takes place, accompanied with heat, pain, and tumefaction, these phenomena must be regarded as effects of the disease which more frequently tend to increase than to interrupt or arrest its progress.

The bulk of the affected parts depends chiefly on the situation and extent of the obstacle to the circulation. If the obstacle be extensive, the quantity of blood admitted to the foot is too small to give rise to congestion; and this not taking place, there is little or no effusion of serosity. Hence there is no increase of bulk in mortification from this cause; and if the obstruction has been effected slowly, the foot and leg may even be atrophiated previously to their being attacked with mortification, the dead parts being shrunk,

* On the sudden spontaneous Obliteration of the Canals of the larger Arteries of the Body, &c. by J. W. Turner, Professor of Surgery in the Royal College of Surgeons, Edinburgh. Edinburgh Medico-Chirurg. Society's Transactions, vol. iii.

dry, and indurated. These physical characters of the disease are entirely owing to the hydraulic conditions to which we have just alluded; for if the obstruction to the passage of the arterial blood be only partial, and particularly if it has occurred suddenly, a considerable degree of congestion is induced, and consequently the effusion of a greater or less quantity of serosity, whereby the bulk of the foot, and more frequently of the leg, is more or less increased: even in this case, however, there is not any marked increase of bulk in the toes, the primary seat of the disease. It is in its progress upwards that the congestion and œdema become manifest; that the skin becomes tense and painful; and that the febrile symptoms, if they have not yet occurred, appear, increase rapidly in severity, aggravate the local affection, and hasten its fatal termination.

From the nature of the obstructing cause, and the unfavourable conditions under which it occurs, the progress of the mortification is seldom arrested; and if it is so, the separation of the dead parts is rarely accomplished, and perhaps a cure never effected.

It is stated by some pathologists that this form of mortification sometimes occurs in young persons, and is much more frequently met with in males than in females. The former statement we believe to be an error originating in an imperfect knowledge of the causes of this disease; for as we ourselves have never seen it in young persons, and as this statement has not been supported by other than mere negative facts, and these too very incomplete, we must continue to regard it as a disease peculiar to persons advanced in life, and occasioned by morbid states of the arterial system, which occur only in such persons, at least to such an extent as to produce local death.

With regard to the greater frequency of the disease in males than in females, we should say from our own personal observation, that this statement is correct only in so far as it regards its occurrence in the inhabitants of towns and cities; but that in those of agricultural districts, where the occupations and mode of living of both sexes are much of the same kind, it appears to occur as often in females as in males.

In every case of gangrena senilis which we have examined after death, we have found the arteries of the diseased limb obliterated in such a degree as to interrupt the circulation of the blood. The obstructing cause consisted, in five or six cases, of a fibrous tissue formed either in the walls or cavities of the arteries, whereby these vessels were converted into nearly solid cords of ligamentous consistence. This state we have traced from the toes more than half way up the leg; it was always connected with ossification of the larger branches and trunks of the thigh and other parts of the body. In other two cases, the obstruction depended on extensive ossification of the principal arteries of the limb; and in several others it was produced by solid fibrine formed around spiculi of bone projecting from the internal surface of the arteries.

Connecting this state of the arteries with the external appearances of the mortification with which it is accompanied, we can have no hesitation in admitting that this form of the disease is the immediate consequence of a deficient supply of arterial blood, and that therefore, if the facts already adduced were considered insufficient to prove that some of the other forms of mortification which we have described may also take place without being preceded by inflammation, those which we have now brought forward will, we trust, remove any doubts that may have been entertained on this highly important part of our subject.

The description which we have given of these two forms of mortification from rupture of the internal and middle coats of the arteries, as well as from obliteration of these vessels, is, we hope, sufficiently characteristic, and such as will enable the physician to distinguish them from other forms of this disease which belong especially to his department of the healing art.

III. Mortification from local and general debility.—As a state of local debility capable of inducing mortification is always connected with, and essentially depends on, a state of general debility, we shall confine the observations which we have to make on this form of mortification to the affection as it occurs under the influence of the latter condition of the economy.

Whatever may have been the causes of the general debility, we regard this state as constituting the essential condition of the disease;—a state in which the physiological and physical properties of the solids and fluids of the body are so modified, (we commonly say enfeebled or debilitated,) that every function of the economy is slowly, ineffectually, or imperfectly performed: innervation and nutrition in particular are so circumstanced, that even those agents on which the varied phenomena of health and life more or less immediately depend, now become the causes of disease and of death. Illustrations of this important fact meet the eye of the physician in the every-day occurrence of diseases of various kinds, but they seldom arrest his attention unless they occur under extraordinary circumstances,—such, in fact, as are observed in those cases of decay and death of the solids to which we shall presently more particularly allude. We have seen that mortification of various parts of the body may be produced by mechanical causes whose operation is entirely limited to the vascular system, in which they impede or arrest the circulation of the blood. This fluid, as well as the solids in general, may be in the healthy state up to the moment at which the local mechanical cause begins to operate and manifest its effects, and these are characterized by a diminution of all those properties, the extinction of which is the death or mortification of the part thus circumstanced. A similar healthy condition of the solids and fluids may precede mortification from inflammation, but the phenomena of the disease are the opposite of the former. Local death does not take place until after the morbid stimulus has increased every property of the part to which it has been applied, to its maximum. The part is thus exhausted of its strength, if one may be allowed the expression, and being deprived also of the means of renewing it, from the changes which have taken place in its more essential elements, it soon sinks into a state of absolute death. In the form of mortification of which we have

now to speak, the fluids of nutrition as well as the solids are, as we have said, in a previous state of disease, and this state is the cause of the general debility which constitutes the essential character of this form of mortification. Notwithstanding, we have classed it with the two former, because of their being all preceded by the same state of the circulation. In none of these three forms of mortification does local death take place without being preceded by cessation of the circulation; a circumstance, we believe, of sufficient importance to authorize our having brought them all under the same general head.

The most marked examples of mortification from general debility are met with in individuals whose strength is greatly reduced by want and fatigue, by the violence of acute diseases of an adynamic character, and by chronic diseases accompanied with much pain, extensive suppuration, or which compel the patient to remain for a long time in the same position. Under these circumstances the local phenomena of mortification present, no doubt, considerable variety; but those which constitute the type of the disease, whether local or general, are always the same, unless in so far as they vary in extent and degree. Thus, mortification from debility may be preceded by a certain degree of pain, increased sensibility and temperature of the part affected; but these changes are not constant, and therefore not necessary to the production of the disease. A local accumulation of blood constitutes, in general, the first perceptible change in the part which is about to be deprived of its vitality. This may take place from the part being submitted to pressure from its own weight or that of the body, from slight friction, puncture, or similar causes. In some of these cases the blood accumulates, partly from the influence of gravitation, and partly from compression of the veins; as, for example, in mortification of the soft parts covering the sacrum, heels, elbows, &c. of persons who have escaped the dangers of typhoid fevers, and who are left in that state of prostration which precludes the possibility of changing the position of the body. It is, perhaps, still more conspicuous in some patients similarly confined with paraplegia from injury of the spinal cord. Sloughing, or at least sphacelus, may have proceeded to a considerable extent before its existence has even been suspected; the patient seldom complaining of any uneasiness till inflammation has been induced by the presence of the dead tissues.

A state of local congestion is also frequently the only change which precedes the sphacelus of the skin to which leeches have been applied, or which has been scarified or punctured. The skin around the leech-bites assumes a dirty purple, livid, or almost black colour; looks sometimes as if it had been injected with ink; presents no previous redness, heat, or pain, and is not swollen except where the blood is accumulated; it drops off in the course sometimes of twenty-four hours, leaving a number of circular openings, which unite and spread by similar succeeding congestions and sloughing of the contiguous skin; — effects which are always to be dreaded when it is found necessary to apply leeches to weak scrofulous children, greatly debilitated by confinement within the walls of an hospital, or low, damp, obscure, ill-ventilated dwellings.

The occurrence of mortification in scorbutus affords another striking example of the influence of general debility in the production of this disease. Portions of the skin often become gorged with blood, die, and slough, without our being able to discover that these parts have received any previous injury. The prostrate condition of all the functions of the economy, indicated by an unwillingness or the incapability to move; the feebleness of the pulse, the fluidity of the blood, and the imperfect state of nutrition in the worst forms of this disease, convert, as it were, the natural and healthy influence of physical agents into a means of destruction. Even the mastication of the food necessary for the support of those affected with this disease, cannot be performed unless at the risk of inducing mortification of the gums, and other soft parts of the mouth. The sloughing of these parts from this cause is sometimes very extensive, accompanied by a continual oozing of blood, and occasionally terminates by the loss of the greater part of the teeth, and even portions of the alveolæ. For a more detailed description of the varieties of form, extent, progress, and termination, as well as the treatment of this form of sphacelus, we must refer the reader to the article Scorbutus.

There is one other form of sphacelus from general debility which requires to be more particularly noticed in this place. It is that which has received the names of *noma; cheilocace; stomacace gangrænosa seu maligna; necrosis infantilis*, [*cancrum oris, gangrænopsis, gangrenous stomatitis*]; *pourriture des gencives; gangrène scorbutique aux gencives; wasserkrebs der kinder; gangrenous aphthæ; water-canker*. The gangrene and sphacelus which have been described under these various appellations occur generally in infants, and in children from two to five years of age, attack the mouth and cheeks, and the external parts of the female organs of generation. Their occurrence in the mouth may be owing to the presence of several diseased states of the mucous follicles, mucous membrane, or walls of this cavity. Thus gangrene and sphacelus may follow inflammation of the follicles or mucous membrane of the mouth, the inflammation being limited to these parts, as in follicular aphthæ, or combined with pharyngitis, scarlatina, small-pox, or scorbutus, examples of which will be found under these several heads. But the form of mortification to which we wish to direct the attention of the reader occurs in the parts which we have named without being preceded by any of these lesions. It commences, however, in the mouth, in the mucous membrane, and, perhaps nearly at the same time, also in the cellular tissue, generally of one, rarely of both cheeks. The general and local phenomena of the disease have been well described by Baron, (Mém. sur une affection gangréneuse de la bouche, Bulletins de la Faculté, 1816,) Isnard, (Dissertation sur une affection gangréneuse particulière aux enfans, Paris, 1818,) Billard, (Traité des Maladies des Enfans, &c.) Richter, (Der Wasserkrebs der Kin-

der, Berlin, 1828. Journal des Progrès, &c. tome iii. 1830,) and others, of which the following are the most important.

Symptoms.—In the first stage of the disease, the mucous membrane of one of the cheeks presents in some cases a small superficial ulcer without pain or discoloration. Sometimes there may be two or three ulcers, seldom more. In other cases, instead of an ulcer, a small whitish or yellowish grey spot appears on the mucous membrane, which sloughs, and gives rise to an ulcer similar to the former, or presenting the same colour as the slough by which it was preceded. It is not certain whether the disease commences by ulceration or sphacelus of the mucous membrane, but we are inclined to believe that it commences by the latter process. But, however this may be, there is observed nearly at the same time a greater or less degree of tumefaction of the cheek, opposite the ulcer or slough of the mucous membrane, which increases with great rapidity, and soon extends to the eyelids and lips. The skin of the swollen parts is pale and glistening, resembling wax, hard towards the centre of the swelling, and more or less elastic. A copious discharge of fluids takes place from the mouth, consisting at first of glairy saliva, and afterwards of a dirty sanies, which give a strong offensive odour to the breath. There is no pain in the cheek, little or no increase of its temperature; and so little are the functions in general disturbed, that children affected with the disease in this stage are sometimes able to amuse themselves with their companions, and partake of their ordinary meals without any apparent inconvenience.

The commencement of the second stage is marked by the appearance of a dull yellowish grey discoloration of the skin on the centre of the swollen cheek, where it is hardest, and opposite the sphacelated mucous membrane of the mouth. The portion of skin thus discoloured soon becomes black, and sloughs; the whole substance of the cheek undergoes the same successive changes, and in the course of a few days, sometimes less than a week, the cheek, lips, and eyelids are converted into a soft putrid mass, which, falling off, destroys sometimes nearly the whole of one side of the face, lays open the cavity of the mouth, and exposes the gums in a state of sphacelus, the inferior and superior maxillary bones denuded or necrosed, and deprived of their teeth. In milder forms of the disease the sphacelus may be arrested before it has proceeded far in breadth or depth, or after it has destroyed only a limited portion of the cheek and lips, and without having attacked the bones. The general symptoms which accompany this the last stage of the disease, are sometimes so mild, so disproportioned to the local ravages of the disease, that one cannot help being struck with astonishment. There is even a craving for food, which the little victims devour with greediness and apparent relish, and which they continue to do even until within a few hours of their death. The intellectual faculties are seldom much affected. In other cases there are from the commencement a low state of fever, a weak quick pulse, heat of the skin, thirst, and loss of appetite. The fatal termination of the disease is likewise sometimes announced by a state of great prostration and colliquative diarrhœa, excited probably by the absorption of the putrid fluids, and their passage into the stomach and intestines When this form of mortification attacks the labia, it presents the same local and general phenomena, commencing with a sloughing or ulcerated state of the mucous membrane of these parts, accompanied with the same kind of tumefaction and discoloration, and terminating in sphacelus, which spreads with great rapidity, and destroys to a greater or less extent the neighbouring parts.

From the above description of this form of mortification, little doubt can be entertained as to its being a disease arising in that state of general debility which we have already endeavoured to explain. All the phenomena which it presents are also so characteristic, that it is not likely to be confounded with any other disease except malignant pustule, from which, however, it may be distinguished, as has been observed by Rayer and others, from the latter disease, when it affects the cheek, always commencing on the external surface.

Prognosis.—The prognosis of this disease is extremely unfavourable when it attacks children in hospitals, for few of them survive its ravages. We have, however, seen its progress arrested in a few instances, and in two cases the patient survived the loss of a large portion of the cheek and a part even of the inferior jaw. When children are placed in more favourable circumstances, where they enjoy fresh air and receive all the care that their situation requires, the remedial means are more efficacious, and the mortality of the disease less considerable.

[Even in hospitals, however, the deaths are not always in very large proportion. In the year 1838, of twenty-three cases, treated in the children's asylum of the Pennsylvania Hospital, nineteen recovered, and four proved fatal. (See the writer's *Practice of Medicine*, 2d edit. i. 34: Philad. 1844.) It would seem to be frequently complicated with pneumonia. M. Baudelocque, indeed, asserts that the complication is invariably found to exist; and MM. Barthez and Rilliet (*Traité Clinique des Maladies des Enfants*, i. 152: Paris, 1843,) met with it in every instance that came under their notice.]

Treatment.—As soon as the disease is perceived, the slough or ulcers of the mucous membrane, whether of the labia or mouth, are to be touched with a mixture composed of equal parts of honey and muriatic acid, or with the latter alone. But when the disease is more advanced, when the swelling is considerable, and the stage of sphacelus has arrived, Mons. Baron strongly recommends that the sphacelated tissues be divided, and the actual cautery, heated to whiteness, carried deep into their interior. (Loc. cit.) This treatment is said to be by far the most successful. Marjolin states that he has employed it with complete success, and also the nitrate of silver, in the state of powder, introduced into the incised sphacelated tissues. (Dictionnaire de Médecine, tom. x.) The muriate [chloride,] of soda is also an efficacious remedy, as it is found not only to arrest the progress of the disease, but likewise removes the stench by which it is accompanied.

[Liquor Potassæ, nitric acid, pyroligneous acid,

chlorine and tincture of chloride of iron, have likewise been advised, with or without incisions; but the caustics or excitants that have met with most favour, have been sulphate of copper, and nitrate of silver in the solid form, so as to produce an eschar over the whole of the sloughing parts. Dr. B. H. Coates (*North Amer. Med. & Surg. Journal*, 1826,) recommends the following application: *Cupri sulph.* ʒij., *Cinchon.* pulv. ʒss., Aquæ, f.ʒiv. M.; or the cinchona may be omitted. When sloughs have formed on the cheeks, the yest cataplasm, or poulticcs containing powdered bark, or chlorinated lime, or chlorinated soda, or pyroligneous acid, may be applied to the part previously washed with any of the lotions already mentioned.]

Every precaution ought to be employed to prevent the putrid fluids from being swallowed, and perhaps the best means of doing so is to wash out the contents of the mouth with a decoction of bark, or a gargle of muriatic acid and honey; and to prevent them accumulating, the patient should be made to lie on the affected side of the face, so that they may find a ready exit. The swollen parts should be covered with cloths dipped in an aromatic fomentation, and occasionally rubbed with the liniment of ammonia, or other stimulating substances. Although this disease originates in a state of general debility, the local treatment which we have pointed out is regarded as the only certain means of arresting its progress. The operation of general remedies is too slow to have any control over a disease which proceeds with such rapidity, and therefore general remedies must be regarded only as auxiliaries. They should consist of nutritious fluids and small quantities of wine, but the administration of the latter in particular must be regulated by the state of the digestive organs, which in this disease are often greatly disordered and highly irritable, and therefore require to be remedied by means suited to the kind of derangement which they may present in each individual case.

[Cinchona, especially, and the salts of its active principle, quinia, may also be freely administered, and iodide of iron offers prospect of advantage. Recently, the internal use of chlorate of potassa has been highly extolled by Dr. Henry Hunt (*Medico-Chirurgical Transactions*, xxvi. 142), in the dose of from ℈j. to ℈ij., in 12 hours, according to the age of the patient.]

II.—Mortification from the violent operation of mechanical, chemical, and physical agents.

The mechanical agents which occasion mortification are violent blows and contusions of various kinds; the chemical, powerfully stimulating substances; and the physical, extreme heat and cold. All these agents produce the same ultimate effect in the part of the body which has been submitted to their influence; that is to say, they deprive, to a greater or less extent, such a part of those properties on which its existence depends. The effect of a contusion produced by a heavy weight falling upon or passing over a part of the body, may be partial or complete death of such a part; and that produced by a bullet, instantaneous death of the soft parts, to a certain extent beyond the limits of the solution of continuity which it occasions in its passage through them. Strong stimuli, intense heat and cold, may operate precisely in a similar manner. The destructive effects of these agents are, however, not always the same in degree or extent, nor are they always produced in precisely the same manner. In one case there may be no gradation of change, no intermediate state of disease which separates these destructive effects from the previous healthy condition of the tissues in which they are produced: local death may be the immediate consequence of the violent operation of such agents. In another, the vitality of the part which has been exposed to the operation of these agents is not entirely destroyed. In this case the part may be regarded as in a state of gangrene; and in the former, in a state of sphacelus. In the present case it may or may not be susceptible of recovery, the result being dependent on the subsequent changes which may take place in the affected part itself, or in those parts with which it is connected. Congestion and inflammation are the changes which always take place, to a greater or less extent, in gangrene of this kind. If they can be prevented from taking place, moderated or removed when present, the suspended functions of the part may be restored; otherwise the gangrene terminates in sphacelus.

The state of congestion and inflammation to which we have just alluded originates in opposite states of the vascular system. The congestion takes place in the gangrened tissues, because of the vessels being deprived of those properties by means of which they were enabled to propel the blood through them. They have ceased to contract, and consequently the blood, although carried into them in the usual quantity, accumulates in, and distends them to a greater or less extent. On the contrary, the blood-vessels situated beyond the gangrened tissues having received little or no injury, are stimulated either by the presence of the disease acting as a foreign body, or have been previously excited by the cause which produced the gangrene, to such a degree as to give rise to an increased influx of blood, to an increase of the sensibility and temperature, and other phenomena of inflammation. Under these circumstances the remaining vitality of the gangrened part is soon destroyed, and consequently a state of real death produced.

However important it may be in a practical point of view to be fully acquainted with all the changes which take place in the structure and functions of a part which has been submitted to the violent operation of mechanical, chemical, and physical agents, we shall not enter into a more detailed description of them than may seem necessary to our present purpose, as this part of our subject belongs almost exclusively to the department of surgical pathology.

We may, however, observe,—1. that the degree and extent of these changes of structure and function are proportioned to the intensity of the agent by which they have been produced, the degree of energy with which it has acted, and the duration of its operation;—2. that the recoverable or irrecoverable condition of the structure and functions of the injured part are essentially deter-

mined by similar modifications of the efficient cause;—3. that congestion or inflammation are subsequent changes depending on the primary lesion or its agent, always effects and complications but never causes of the disease, unless secondarily and under those circumstances to which we have alluded, that is, when the part is left in a recoverable state, or in a state of gangrene;—4. that, therefore, mortification from the violent operation of mechanical, chemical, and physical agents, differs from that produced by inflammation, an obstacle to the circulation of the blood, and local and general debility; the disease, in the former case, consisting essentially in a simultaneous lesion of all the elements; in the latter, of one element only of the part in which it is produced. There are, no doubt, slight exceptions to these general conclusions; but considering them in a general point of view, they appear to us to be drawn from a series of facts sufficiently broad and distinct to render it necessary to consider apart these two forms of mortification, independently of the advantage of doing so in a practical and scientific point of view.

For the reason before stated, we shall confine the few observations which we have still to make on this form of gangrene, to some of the more remarkable phenomena which it presents when produced by the action of intense heat and cold on the external parts of the body, and strong stimuli on the digestive mucous membranes.

1. **Mortification from Intense Heat.** — The effects of intense heat on the surface of the body are a greater or less degree of excitement, a temporary or permanent suspension of the functions of the part to which it has been applied; or in other words, there is produced a state of inflammation, gangrene, and sphacelus. The states of inflammation and of gangrene do not require to be described, as the phenomena which they present in the present case do not differ materially from those which accompany the same changes when they occur without any obvious cause, if we except the rapidity of their progress, and also the more sudden and extensive development of phlyctenæ, bullæ, or blisters, particularly when the heat is applied by means of a fluid. The state of sphacelus produced by the direct application of heat presents several very characteristic appearances. The skin is of a yellow, grey, brown, or black colour; dry and hard; sunk below the level of the surrounding surface, and quite insensible. These are, sometimes, the only appearances which are at first perceived to follow the action of intense heat, and are certain indices of the complete death of the skin to a greater or less depth. The deeper-seated tissues may also be deprived of their vitality, but to what extent cannot be determined by any change which the cutis may have suffered. The inflammatory redness which succeeds to this state appears almost immediately, and indicates by the rapidity of its course and the peculiar colour which it assumes, the extent both of the gangrene and sphacelus, the existence of which could not be determined by any previous change of the cutis produced directly by the heat. We do not wish it to be understood that we are speaking of gangrenous inflammation. The degree of inflammation produced by intense heat may, certainly, be such as to give rise to mortification; but in the present case we wish to show that both stages of this disease may be, and often are, the immediate effects of the physical agent in question, and, consequently, whether capable of being detected or not by any peculiar change in the affected part, precede the inflammation to which they are often ascribed.

The extent of the sphacelus may be said to be always increased by the subsequent inflammation; and parts that were only in a state of gangrene are, by means of it, converted into a state of sphacelus; and hence the necessity of preventing the extension or modifying the violence of the inflammation which succeeds to burns or scalds.

Whether the state of sphacelus may have been produced by the action of the heat or the subsequent inflammation, the limits of the disease are seldom defined before the end of a week or ten days. The dead are then separated from the living parts, and an abundant suppuration takes place from the denuded surface. The solution of continuity is often imperfectly repaired in consequence of the exuberant production of granulations, which, instead of acquiring the organization of the cutaneous texture, assume that of contractile tissue, which often gives rise to great deformity of the parts with which it is connected. The general as well as the local effects of intense heat in case of burns and scalds, are proportioned to the extent and violence of the injury produced by this agent. They are characterized by excessive pain, great mental agitation, and extreme thirst; the pulse is rapid and hard, the skin hot, and the secretions in general are diminished in quantity.

If a remission of these symptoms does not take place soon, the pulse becomes small and feeble, and the skin covered with a cold sweat; the sufferings of the patient are announced by wild delirium; or he sinks into a state of stupor, accompanied with convulsion. In some cases of violent and extensive burns, these symptoms make their appearance almost immediately after, and are followed by death in the course of a few hours.

The general symptoms are greatly modified by the situation of the burn or scald, independently of the age, constitution, and temperament of the patient. For it has been observed that a burn of any of the extremities gives rise to much less constitutional disturbance than a burn of the walls of the chest or abdomen, although it may be of the same degree and extent in each of these parts. The greater functional derangement in the latter case depends, no doubt, on the vicinity of the disease to the important organs contained in the abdominal and thoracic cavities.

It has been asserted that the mucous membranes, and especially the digestive mucous membrane, are not only inflamed in all cases of burns of any considerable extent, but that the secondary fever that follows is chiefly owing to this lesion of the digestive organs. With regard to the latter statement, nothing can be more obviously erroneous, as the intensity of the pain in all such cases is in itself sufficient to produce the secondary fever. However far the former statement may be correct, we have not had sufficient opportunity to determine. We have seen the respiratory and mucous membranes red and vascular in one fatal

case, the patient having died at the end of four days. In two other cases this membrane in both of these organs was pale, and without any appreciable lesion. These two patients were females, and had the inferior half of their bodies severely burnt, from their clothes having caught fire: both of them lived seven or eight days. It is possible that the difference in the duration of the disease in these cases may have had some share in effecting the difference observed in the state of the mucous membrane after death. But it is of greater importance to observe that the secondary symptoms were equally severe in all the three patients.

With regard to the local and general treatment of burns and scalds, we shall only observe that in the latter, antiphlogistic measures, carried to the extent which the individual case demands, must always be had recourse to, although the secondary fever, when it occurs at an early period, and depends more on the shock which the system has received and the violence of the pain, is but little under the control of such measures. More benefit is derived from the administration of anodynes, and the use of those means which the surgeon has found to be most successful in allaying the local heat and pain of the injured part. Opiates are particularly useful in abating the great nervous excitement which accompanies this form of fever, and in procuring a temporary respite from suffering.

It is of much importance to distinguish between the febrile excitement which immediately follows the injury, and the secondary fever which is the consequence of the subsequent inflammation. As in the latter case, general bloodletting is always more or less useful. The same indication is pointed out when inflammation of an internal organ has taken place, although leeching and cupping are oftener to be preferred to the lancet. In stout young persons of a sanguine temperament it may be necessary to employ both.

2. **Mortification from Cold.**—The local and general effects of intense cold are, in many respects, very similar to those produced by intense heat. If the degree of cold be not very great, the circulation and temperature, of the skin for example, when submitted to its influence, are increased, as is shown by this tissue assuming a redder colour, and feeling warmer than before. On the contrary, if the cold be very intense, it may not give rise to any appreciable degree of local excitement; the vitality of the skin, and even of the deeper-seated tissues at the same time, may be either greatly reduced or entirely destroyed by the direct operation of this physical agent. There is, however, this difference between the local effects of heat and cold, viz. that the former may produce complete disorganization of the tissues submitted to its action; whereas the latter never produces such a change. In the former the local redness rapidly increases, in the latter it rapidly diminishes; and in the same manner does the sensibility increase and decrease under the influence of these agents respectively. (We are now speaking of the immediate, and not the subsequent effects of cold.) The general effects, or functional disorder produced by the immediate operation of cold, are very different from those produced by heat. If the cold has been limited in its operation to the extremity of a limb, complete death of the part may ensue without any general functional derangement being induced. But if the whole body has been exposed to its operation, every function becomes depressed, and a state of lethargy soon succeeds, from which the patient is often not to be roused, either by the entreaties of his friends or the best directed efforts of the physician.

The symptomatic fever which follows the local effects of cold does not take place until inflammation has succeeded to these effects, for it depends exclusively on the presence of this morbid state; and hence the similarity said to exist between the symptoms of mortification from cold, and those of mortification from heat. It is, in fact, only after the occurrence of inflammation that the local and general symptoms of mortification from these two causes acquire a striking similarity in kind, if not in degree.

Although a state of gangrene and sphacelus of a limb or a portion of a limb may be induced by the direct operation of intense cold, we may not be able to determine the existence of either until inflammation has taken place. It is, however, said that the toes and fingers have been seen to fall off, having been deprived of life on account of the intensity of the cold. But by far the most frequent occurrence of mortification is when a frozen limb is exposed to natural or artificial heat, as before a fire or during thaw. The blood that was before frozen thus regains its fluidity, and gangrene and sphacelus, if they were not previously, are now more or less rapidly induced. Under these circumstances, the skin assumes a dark red or livid colour, where it is in a state of gangrene or sphacelus, and the neighbouring skin acquires an erythematous blush, accompanied with a prickling or tingling sensation, and a feeling of weight or stiffness in the limb. By-and-bye phlyctenæ appear on the inflamed part of the limb, and grey, livid, or black spots on that part of it which is in a state of sphacelus. Then also putrefaction commences, and extends till its progress is arrested by the adhesive inflammation. In this kind of mortification, as well as in every other, the extension of the sphacelus depends much on the degree of the subsequent inflammation, to subdue and still more to prevent the occurrence of which every means ought to be promptly and sedulously employed.

The treatment of a frozen limb, for example, consists in rubbing it with snow or pounded ice, in order to re-establish gradually its sensibility and circulation, and afterwards the use of a circular roller carried from the toes upwards, the good effects of which depend on the obstacle which it opposes to the accumulation of the blood in the limb, and to the distension and swelling to which the presence of this fluid and the subsequent effusion of serosity give rise.

3. **Mortification from Stimuli.**—The stimuli included under the present head, and which give rise to mortification, are those which exercise a chemical influence on the tissues with which they come in contact. The nitric, muriatic, and sulphuric acids may be cited as furnishing us with examples of chemical stimuli which produce local death when they are applied to the skin or

mucous membrane of the digestive organs. The local effects of these substances resemble very much those produced by intense heat. Like the latter physical agent, they instantly destroy, to a greater or less depth, when strong, the cutaneous and mucous tissues. In both cases, the vitality and texture of these tissues are destroyed, and the functional derangements of the economy are also very nearly the same, particularly when the former have been applied to the digestive mucous membrane. The functional derangement, too, which follows the action of these chemical stimuli, does not arise in consequence of absorption, but, as is the case in intense heat, from the sudden shock which the nervous system receives at the moment they are applied, and the state of excitement of this system from the inflammation to which they give rise. Instead of a state of complete local death, or sphacelus, we may have as the result of their action, when diluted, a state of gangrene, or simply inflammation, and which may, as in similar states produced by other causes, terminate in sphacelus. A state of sphacelus is, however, the far more frequent effect of their immediate operation in the undiluted state, to which inflammation occurs as a subsequent change, and which seldom proceeds, unless in the mucous membranes, beyond that degree necessary for the elimination of the dead part.

The local effects of these chemical stimuli are not often confined to one portion of the cutaneous or mucous tissues; they are generally perceived on several portions of both, the form and extent of which are subject to great variety, more particularly in the stomach; the states of vacuity and fulness, or the nature of the contents of this organ, modifying, in a greater or less degree, both of these local circumstances.

The changes of colour which indicate that local death has been produced by these chemical stimuli are well known; they are either yellow, yellowish brown, brown, or black, changes which seem to depend much on the quantity of blood contained in the part, and the strength of the acid which has been applied to it.

Perforation of the stomach, giving rise to a communication between the cavity of this organ and that of the peritoneum, is not unfrequently the consequence of the introduction of these acids into this organ, and we believe that when it does take place, it is generally soon after their introduction, and before the peritoneal inflammation which ensues has been sufficiently long established to furnish coagulable lymph, and unite some neighbouring organ with the stomach, opposite that part of it which has been acted upon by the acid. Under these circumstances, therefore, the perforation is not the consequence of the separation of the sphacelated tunics of the stomach by their subsequent inflammation, but is the result of their immediate and complete destruction.

There are several important points connected with this part of our subject which merit particular consideration, more particularly the change of colour and consistence to which chemical stimuli give rise in the mucous membrane of the stomach, to the former of which we have already alluded, but into the consideration of which we do not think it necessary to enter in this place, as we have already insisted on similar changes in the article Melanosis, where we have endeavoured to show that they may be produced by the action of the gastric acid after death, and present appearances so similar to those of the former as to lead the toxicologist and medical jurist to commit the most serious mistakes. As these chemical stimuli are classed among the poisons, we refer the reader to the article Toxicology for a description of the symptoms to which they give rise, and the treatment which they require.

III.—Mortification from the deleterious influence of certain poisons.

The poisonous substances which we propose to include under the present head are those which are derived from the animal and vegetable kingdoms. Some of these substances are natural, others morbid products. The former consist in a peculiar healthy secretion of certain animals, which is capable of producing disease or death in other healthy animals, and for which we have no distinctive appellation except the vulgar term of *venom*. The latter, derived from the animal kingdom, are generated by a state of disease of the animal solids and fluids, are capable of producing the same morbid state to which they owe their formation, when communicated, directly or indirectly, from one animal to another, and are termed *virus*. We have no specific denomination for the deleterious agent generated by the decomposition of animal matter, and by that diseased state of rye which gives rise to mortification.

Mortification arising from these different sources may be considered with advantage under the following heads:—1. mortification from a deleterious agent generated in healthy animals; 2. mortification from a deleterious agent generated during the decomposition of animal substances, and in animals in a state of disease; 3. mortification from a deleterious agent generated in vegetables in a state of disease.

1. Mortification from a deleterious agent generated in healthy animals.—We have already said that a peculiar healthy secretion of certain animals is capable of giving rise to mortification, when directly applied to the body of another healthy animal. The most striking examples of this are met with in the effects which follow the bite of the *cobra di capella*, the rattlesnake, and the viper. When the poison of these animals is inserted into the cutaneous and cellular tissues of one of the limbs, the most acute pain is produced, which rapidly extends in both directions towards the extremities of the limb; the cellular tissue becomes œdematous, much swollen, and hard. If there be any redness of the skin around the wound, it is of short duration, and is succeeded by a livid discoloration, which increases in extent, followed by the formation of phlyctenæ, and diminution of the temperature of the affected part. The hard œdematous swelling of the skin and cellular tissue then becomes soft, crepitates when pressed, and a sanious discharge, of a fetid odour, runs out from the wound. During the short time these local changes are taking place, the functional derangement produced by the absorption of the poison proceeds with extreme rapidity, and it may terminate in death in the

course of a few hours. Almost immediately after the insertion of the poison, a sense of great oppression is felt in the region of the heart: the respiration becomes laborious; there is great pain in the head, or vertigo, and frequently pain in other parts of the body, but particularly in the stomach and intestines, accompanied with vomiting and diarrhœa: vision is also sometimes much impaired, and the pulse small and intermittent. As the influence of the poison becomes more extended, to these symptoms are added extreme debility, great anxiety, the most unquenchable thirst, cold sweats, hiccup, and frequent fainting fits: the skin assumes a sallow, jaundiced aspect, and the breath becomes extremely offensive. Such is a general description of the local and general effects which follow the insertion of the poison of these animals into the cutaneous and cellular tissues. Although the local treatment is strictly surgical, we may state here that it consists, as recommended by Celsus, and very recently by Sir David Barry and others, in the application of a ligature to the limb between the wound and the heart, so as to arrest the venous circulation and intercept the poison; the use of the cupping-glass, and the actual cautery. Various topical remedies are recommended, and are said to have been employed with success. Indeed, the local appears to be much more successful than any general treatment that has yet been devised, in arresting the progress or in preventing the baneful effects of the poison of these animals. The liquor ammoniæ is regarded as the best internal remedy that can be employed. It is also said that stimulating sudorifics have been found useful; but it does not appear that much reliance is to be placed on the use of internal remedies when the poison has once entered the system, and when it possesses such a degree of virulence as to destroy the vitality of the part to which it is originally applied. It is to such cases alone that our observations apply, as in milder cases mortification seldom occurs in consequence of the direct application of the poison.

2. **Mortification from a deleterious agent generated during the decomposition of animal substances, and in animals in a state of disease.**—The production of mortification from a septic agent, generated during the decomposition of animal substances, or in animals in a state of disease, being introduced into the blood or applied to the surface of the body or of sores, is by no means a rare occurrence. The most obvious and frequent examples of mortification of this kind are met with in the bodies of those who have died from mortification of some external part of the body, from whatever cause arising. Mortification of a portion of a limb, succeeding to inflammation, to a mechanical injury, to an operation, is often followed by mortification of some internal organ. The same may be said of mortification of one internal organ, giving rise to mortification of another internal organ, although it is by no means so frequently observed as in the former case. We have seen a considerable number of cases of gangrene and sphacelus of internal organs originating in the existence of similar states on the external surface of the body. That such is frequently the origin of mortification of internal organs there cannot be the slightest doubt; for it occurs when this disease affects an external part of the body from inflammation, a surgical operation, or other causes to which the internal organs, which are afterwards found to be in a state of mortification, were in no way whatever subjected. The septic principle is carried into the blood, and appears to give rise to a state of gangrene or sphacelus, without these being preceded by any perceptible intermediate change. For when we examine the organ thus affected, we do not perceive any of those changes which accompany inflammation, such as red induration or suppuration; nor are there any symptoms during the life of the patient which indicate the presence of a local disease. The lungs and liver may be extensively affected without the functions of either undergoing any modification which indicates the existence of such a disease. They are, however, modified, as well as those of every other organ of the body, by the contaminated state of the blood, to which we have already ascribed that peculiar assemblage of symptoms which make their appearance at the close of the fatal termination of sphacelus.

The morbid appearances of this kind of mortification of internal organs present several peculiarities. The tissues of the organ do not, as we have already said, exhibit any of those changes which constitute the anatomical characters of inflammation. They are, on the contrary, found to present those appearances which we observe on a part of the external surface of the body to which a virulent poison has been applied, viz. a circumscribed dull deep-red, livid, brown, or black colour, in which state they feel firmer than natural; or they are of a dirty grey colour, of a soft pulpy consistence, or entirely decomposed and transformed into a grey or reddish-brown fluid of the consistence of pus, around which the other tissues may not present any material alteration. These appearances are most frequently observed in the lungs and liver. They may exist in several points of these organs at the same time; may occupy an extent of surface varying from the fourth of an inch to two or three inches; and are much more frequently situated towards the external surface, than in the central parts of these organs. In the lungs they are generally seen under the pleura, and if the patient survives a certain length of time the contaminating influence of the poison to which they owe their origin, the pleura sloughs, and pneumothorax is produced. We have seen two examples of this termination of sphacelus of the pulmonary tissue and pleura, arising in, or connected with, sphacelus of the ankle-joint in one patient, and in another with sphacelus of the larynx.

The production of gangrene and sphacelus from a septic agent generated in a state of disease is no less conspicuous in what is called **hospital gangrene.** Whatever may be the causes of hospital gangrene, this local disease may be communicated by means of the fluids of the diseased part being brought in contact with the surface of common sores, a scratch or prick, and, it is said, with the healthy skin. When the disease is thus produced, for example in a sore, the surface assumes a paler or livid aspect, becomes swollen and painful, and covered with a viscid

grey matter tinged with specks of blood. The surrounding integuments soon present the same appearances, are converted into dirty-grey spongy sloughs, the extent of which, as well as the progress of the disease, is marked by the preceding discoloration, which is often of an erysipelatous character, affecting at the same time the skin and subjacent cellular tissue, and thence the adjoining lymphatic glands, which are also destroyed in the manner above stated. But although the state of sphacelus be often preceded by an erysipelatous redness, the separation of the dead parts is always accompanied by more or less hemorrhage, which shows that the plastic property of the blood by means of which hemorrhage is prevented, as well as the vitality of the solids, is destroyed in this kind of mortification. Dr. Hennen, in his *Principles of Military Surgery*, states that in the last stage of the disease there is a bloody oozing from the surface of the denuded parts; that in lifting up the edge of the flabby slough, the probe is tinged with dark-coloured grumous blood, with which its track becomes immediately filled, and that at this period of the disease repeated and copious bleedings take place which rapidly sink the strength of the patient. The sloughs, whether falling off spontaneously, or detached by art, are thickly studded with specks of arterial blood; and when hemorrhage takes place from an artery which it is necessary to tie, and which is ruptured by the ligature, the application of the tourniquet or other pressure is employed in vain, for while it checks the bleeding, it accelerates the death of the limb, which becomes frightfully swollen and horribly fetid.

The constitutional symptoms of this kind of mortification sometimes precede the local affection, at other times do not make their appearance until it is fairly established. But however this may be, they are characterized by greater or less derangement of the digestive functions, a feeble and quick pulse, and great weakness of mind and body. "Men," says Dr. Hennen, "who had borne amputation without a groan, shrunk at the washing of their sores, and shuddered at the sight of a dead comrade; or even, on hearing the report of his death, predicted their own dissolution, and sunk into sullen despair." The fatal termination of this frightful form of mortification is announced by extreme prostration, vomiting, hiccup, involuntary dejections, and coma.

The treatment of the present form of mortification will depend much on the state of body and mind of the patient, and the situation in which he is placed. When it occurs in a healthy individual, his removal from the place in which it was communicated to him, and the topical application of those remedies (the concentrated acids or actual cautery) which are now found to be most efficacious in arresting the progress of the disease, will in general effect a speedy cure. In such means, also, consists the most essential part of the treatment which the situation of those patients will allow in whom the disease occurs spontaneously, that is to say, without any direct cause, and whose mind and body have suffered from the injurious influence of disappointment and privations of various kinds. Cheering prospects, wholesome food, and change of situation, are well known to be the most effectual means of preventing and checking the ravages of this disease in hospitals, or other situations, in which a greater or less number of patients are confined, and without which all our remedies are often entirely useless, or procure only a temporary or partial benefit.

The next form of mortification produced by a septic agent generated by disease is that which is called **pustule maligne**, or *charbon*, by the French, and *milzbrand*, by the Germans. By some pathologists this disease is believed to originate in horned cattle, among which it sometimes prevails epidemically to a very great extent, and that when it occurs in man, it is always derived from such animals. By others it is said to occur *sporadically* in persons who have no connection, either directly or indirectly, with animals so diseased. Be this as it may, the important fact is, that a septic principle is generated in this disease, which possesses the property of communicating a similar disease from one animal to another and from person to person. Hence it is that herdsmen, butchers, and tanners, and all other persons who handle the skin, blood, and flesh of these animals, are those in whom the malignant pustule or carbuncle is generally observed. Enaux and Chaussier regarded the occurrence of the disease in such persons as strong proof that it was communicated to them by immediate contact; and in further support of this opinion, they adduce the facts that malignant pustule makes its appearance exclusively on those parts of the body which are usually uncovered, such as the face, neck, breast, and shoulders; the hands and arms, feet and legs; and that in general it is observed in such persons when it reigns endemically among cattle. (Enaux et Chaussier, Méthode de Traiter les Morsures des Animaux Enragés, &c. suivie d'un précis sur la pustule maligne. Dijon et Paris, 1785.)

Numerous examples are recorded of malignant pustule being communicated in the manner above alluded to, as well as of its being communicated to persons employed in dressing those affected with the disease. The blood appears to be strongly impregnated with the septic principle generated in this disease, for parts of the body on which this fluid has been deposited have soon after been affected with malignant pustule, and similar effects follow its injection into the veins, as was the case in the experiments of MM. Leuret and Hamont. (Journal des Progrés des Sciences Médicales, 1827.)

Those who eat the flesh are also often affected with an eruption of malignant pustules, and other symptoms similar to those which the animal from which the flesh was taken presented.

Malignant pustule commences in the form of a small vesicle, filled with a somewhat bloody serosity, accompanied with a circumscribed œdematous swelling of the skin and cellular tissue beneath it, which soon extends in breadth, followed by an erysipelatous redness of the skin. As the swelling increases, the skin acquires a glossy aspect, and presents here and there small and large phlyctenæ. The erysipelatous redness soon assumes a livid tint; the central portion becomes brown or black, hard and insensible, whilst the surrounding parts are tense and emphysematous. These changes

are produced with greater or less rapidity, and sometimes extend to a considerable distance, followed by extensive sloughing of the skin and cellular tissue. The local and general symptoms of malignant pustule resemble very much those which follow the bite of the viper, &c. which we have already described, and require nearly the same treatment.

Maurand (Histoire d'une Maladie très singulière, &c. in Hist. de l'Acad. des Sciences, 1766, i. 97) relates some cases of malignant pustule produced by the flesh or blood of over-driven cattle, although their bodies presented no appearance of disease. It would appear that the flesh of such animals may be eaten with impunity when cooked, but that if the blood or raw flesh be applied to the wounded skin, or even to the unbroken skin, diffuse cellular inflammation is excited, or malignant pustule produced, which frequently terminate fatally; and M. Dupuy states that the malignant pustule or carbuncle of cattle may be produced by applying to a wound the blood of an animal that has died of gangrene of the lungs. (Revue Médicale, 1827, ii. 488.)

The carbuncle of plague and the malignant pustule present precisely the same local characters as those which we have just described, and seem to owe their origin to a similar cause, viz. the development of a septic agent, and which in the former seems to be formed during the progress of the disease in which it is observed. The number of the pestilential carbuncles vary considerably, and are generally in proportion to the gravity of the disease which they accompany and in which they originate. Pestilential carbuncle, like malignant pustule, may be communicated by contact or inoculation; and it is said by Diemerbroëck and Desgenettes, may prove fatal without giving rise to the general symptoms of the plague. (*Diemerbroëck*, Tractatus de Peste, 1665. *Desgenettes*, Histoire Médicale de l'Armée d'Orient, 1802.)

There can be no doubt that a septic agent is developed during the decomposition of animal substances, apart from the living body, capable of producing mortification. This state, however, is always preceded by erysipelatous inflammation, which spreads with great rapidity and proceeds to a great extent, and followed during its progress by extensive sloughing of the skin and cellular tissue, and is accompanied by the same kind of general symptoms that characterize the action of all septic agents on the economy. It is difficult to say how far wounds received in dissection or in the inspection of dead bodies, and which are followed by diffuse erysipelatous and gangrenous inflammation, depend on the presence of a septic agent developed during the progress of disease, or after death. One thing is certain, that the frequency and severity of the disease which follows such wounds, have, so far as we can perceive, no connection with the ordinary changes of the solids and fluids produced by putrefaction; for the results of our own experience are in accordance with the generally received opinion, that it most frequently occurs after wounds received in the examination of recent bodies, and also in the bodies of those who have died of inflammatory effusions into the serous cavities. Nevertheless similar consequences follow pricks and wounds from putrid bones, and the contact of putrid animal matter with the abraded surface of the skin; and Cullerier says that gangrene sometimes attacks the penis of those persons employed to clean out the cesspools in Paris, if they are affected at the time with gonorrhœa.

It would appear that a septic agent is developed in various grains in a state of disease, but more particularly in rye, which, when used as an article of food, has frequently given rise to one of the worst forms of mortification. This form of mortification has, perhaps, been exclusively observed in various parts of the continent of Europe, and particularly in those districts of France, Germany, and Switzerland, in which rye forms the chief article of food of the inhabitants. In these and various other parts of the continent, the local and general effects of spurred rye, as it is called, have been observed and described by several physicians; but it was not till the year 1597 that they were traced to the internal use of that diseased grain. Since then, repeated epidemics have occurred, and always during rainy seasons, and which have prevailed most in places naturally moist and of a poor soil,—circumstances to which, in fact, the ergot or cockspur owes its origin. We shall not stop to inquire into the causes of the spur in rye, and besides shall confine ourselves to a general description of its effects. The effects produced by the use of spurred rye as an article of food are very various. In some individuals the influence of the poisonous ingredient is chiefly exerted on the brain and nervous system, the most remarkable symptoms being vertigo, dimness of sight, pain, loss of sensibility, cramps and convulsions, yellow discoloration of the skin, thirst and feeble pulse. These symptoms are greatly modified in degree in different individuals, and are sometimes slow and at other times very rapid in their progress. In the most acute form of the disease death may take place at the end of one or two days, preceded by dreadful cramps and convulsions of the whole body. Even in the milder cases, the convulsions are more or less severe towards the fatal termination of the disease; and hence this form of the disease is called **convulsive ergotism** by French writers, and is vulgarly denominated in Germany *Kriebelkrankheit*, or creeping sickness. In other individuals, placed apparently in similar circumstances, the most remarkable effect which follows the operation of the same septic agent is gangrene or sphacelus of certain parts of the body. Hence this form of the disease has received the name of **gangrenous ergotism,** *necrosis ustilaginea, seu epidemica.*

The local, like the general effects of spurred rye, present considerably variety. The following description of them taken from the works of those authors who have witnessed the disease in various parts of the continent, contains the principal forms under which they have appeared. In one class of patients seen by Dodart, the disease was characterized by vertigo, a malignant form of fever, great drowsiness, and gangrene of the inferior extremities. The gangrene was preceded by a sensation of numbness in the legs, which became afterwards painful, slightly swollen, but not inflamed. The skin was cold and livid, and

the sphacelus commenced in the centre of the limb, and did not reach the skin till some time after. (Journal des Savans, 1676.)

In a second class of patients, in which the disease was observed by Noël, surgeon to the Hôtel Dieu of Orleans, the sphacelated parts were dry, livid, or black: these appearances commenced in the toes, and gradually extended sometimes as far as the thighs. In some the sphacelated parts separated spontaneously; in others the progress of the disease was arrested by scarifications.

Lang, who observed the gangrenous ergotism in Luzerne, Zurich, and Berne, says that the disease commenced with lassitude and a sensation as of insects creeping under the skin, without fever. Soon after, the extremities became cold, pale, wrinkled, and benumbed, and at last quite insensible and incapable of motion; afterwards acute pain was felt, referable to the central parts of the limbs, which was exasperated by heat and mitigated by cold applications; there was then, also, fever and headach; the pain extended from the hands and feet to the shoulders, legs, and thighs; and lastly, the affected parts became dry, shrunk, and black, and dropped off at the joints. Entire extremities were thus separated from the body without hemorrhage. Many patients lost both legs, several the arms, and a few both legs and arms. (Descriptio morborum ex usû clavorum secalinorum cum pane, 1707.) In other cases, the chief symptoms were, at first, spasmodic contractions of the limbs, afterwards great weakness of mind, voracity and dyspepsia, which generally terminated in fatuity or sphacelus. (Rust's Magazine, xxv. to which the reader is referred for a detailed account of the local and general effect of spurred rye.) The parts most frequently attacked with gangrenous ergotism are the inferior extremities. Men are more subject to the disease than women, and children and old people than adults.

From the above description of the local and general effects of spurred rye, it is by no means easy to say in what manner this poisonous article of food operates so as to produce mortification. One thing, however, appears certain, that it is not by an inflammatory process of the part which becomes the seat of the disease. That cessation of the circulation and loss of the sensibility and motion of the limb observed to take place at an early period of the disease, are not the consequences of inflammation, is clearly proved by the nature of the local, if not the general symptoms which we have detailed. All these local changes appear to be produced as direct consequences of the spurred rye, acting through the medium of the blood or nervous system, or both at the same time. For we have seen that the dead parts are separated without hemorrhage, and it is stated that the blood, when taken from a vein, is dark and so very thick that it only oozes out from the orifice of the wound.

In several animals which died after having been fed for some time on spurred rye, and who presented several of the symptoms already mentioned, gangrenous spots are said to have been found in the stomach, intestines, and liver. But the morbid anatomy of this disease is extremely imperfect, and does not enable us to offer any explanation either in regard to the nature of the disease itself or its complications; or to suggest any means other than those already employed in its treatment, and which may be said to be almost entirely empirical. Bloodletting, emetics, and purgatives have been employed by some; tonics and stimuli by others; and lastly, anodyncs and narcotics, all of which methods of treatment appear to have been more or less successful in one form of the disease, and of little or no avail in another. Stimulating lotions, warm fomentations, and friction appear to mitigate the local symptoms, and along with the general treatment, sometimes to arrest the further progress of the disease.

R. Carswell.

MUMPS. See Parotitis.

[MYELITIS. See Spinal Marrow, Diseases of the. It has been proposed by Dr. Marshall Hall, to call inflammation of the membranes of the brain *meningitis;* that of the substance or neurine of the brain *myelitis.*]

NARCOTICS, (from *νάρκη, stupor,*) syn. *hypnotica.*—These are medicines which in small or moderate doses produce temporary excitement succeeded by depression, which is generally followed by sleep. This definition does not comprehend the anodyne power strikingly displayed by many narcotics; because, although it is undeniable that many of them are capable of alleviating pain, yet, as this is not a general property of narcotics, it cannot correctly enter into a definition of the class.

Narcotics are commonly confounded with sedatives, but there are sufficient reasons for separating these two classes. In the first place *narcotics* operate as diffusible excitants, and by a proper regulation of the dose, and its administration at short intervals, their exciting influence only is obtained; in the second place, the depression or collapse which follows the administration of the full dose of a narcotic is the result of the previous excitement; and although this is not in the direct ratio of the degree of excitement, yet, if the excitant effect be considerable, and raised to its acmé, the succeeding collapse is proportionate. On the other hand, *sedatives* immediately depress the vital energies by a peculiar action upon the nervous centres, without causing previous excitement; and, if the dose be sufficiently large, they destroy both mobility and sensibility. Such are the distinctions between the effects of the administration of narcotics and sedatives,—distinctions undoubtedly sufficient to authorize the separation of these classes of medicinal agents.

The first effect of a moderate dose of any narcotic is an augmentation of the action of the heart and arteries, followed by an elevation of the heat of the whole body, and a slight sensation of fulness in the head. These symptoms are accompanied with an unusual exhilaration of spirits and aptitude for exertion; effects which, however, in a little time subside, and are followed by languor and drowsiness, gradually terminating in perfect sleep. The augmented arterial action is succeeded by a small, feeble, and irregular state of the pulse; the temperature of the body is lowered; and the respiration, which in the first instance was accelerated in the ratio of the augmented vascular action,

falls below the natural standard; an imperfect decarbonization consequently is effected in the pulmonary circulation; so that the blood transmitted to the brain being inadequate for due excitement, the whole system necessarily languishes. The function of the skin is, however, increased, and passive diaphoresis occurs, accompanied by itching and the dilatation of all the erectile tissues; finally, the glandular excretions are diminished, the mouth feels dry, and both the bile and the urine are evidently defective. The influence on the stomach varies according to the state of the organ; if the narcotic be taken into an empty stomach, it diminishes the desire for food; if swallowed at the time of taking food, the organ is enervated, and chymification suspended; if a short time after a meal, the process of digestion is arrested; and if vomiting be excited an hour or two afterwards, the food is ejected in the state in which it was swallowed. The same effects follow the introduction of a narcotic into the rectum: the intestines, besides, frequently lose their ordinary contractility, and costiveness ensues. This, however, is the result of a moderate dose of only some narcotics; others rather increase than diminish the peristaltic motion of the intestinal canal.* After awaking from the sleep induced by a narcotic, the individual frequently experiences slight headach, some degree of nausea, languor, and a more than usual susceptibility of impression, with tremours of the hands, which continue until some excitant, such as coffee or a glass of wine and water, be swallowed. By degrees these symptoms subside, and the system remains in its accustomed state, unless the dose of the narcotic have been more than can be termed moderate, in which case headach, sometimes vertigo and confusion of ideas supervene and continue for several hours; whilst anorexia, constipation, and a scanty urinary discharge are experienced for a considerable time, and the individual is left weak and uncomfortable.

If the dose of the narcotic substance be so large as to prove poisonous, headach, vertigo, imperfection of vision, and stupor, are experienced, without any previous apparent excitement; the person soon becomes motionless and insensible to external impressions; he breathes slowly; and for some time the expression of the countenance denotes only sound and deep repose. By degrees the features change, and acquire a ghastly character; the breathing, under the influence of some narcotics, is stertorous, as in apoplexy, under that of others it is soft and natural; the pulse becomes irregular, sinks, and at length is almost imperceptible; the muscles relax, the jaw falls, and death rapidly closes the scene. Many of the symptoms following the administration of such large doses of narcotics resemble, in some respects, those attending *apoplexy*; in others, those of *epilepsy*; and occasionally those of *hypertrophy* of the brain; but in every case the distinction is apparent, when the circumstances preceding and attending the attack are duly investigated. Thus, in apoplexy there are generally premonitory indications of the threatened attack; and when the sopor has commenced, the patient cannot be roused to any consciousness, which is not the case in narcotic poisoning. The same kind of sopor attends epilepsy; it terminates suddenly, and the attack of the paroxysm is abrupt. Cerebral hypertrophy is a slowly progressing chronic affection.

The influence of narcotics is modified by a series of circumstances; for example, by the nature of the narcotic, the extent of the dose, the time of the day at which it is administered, the combination in which it is given, the state of health of the individual, habits of life, age, sex, and temperament; climate, and idiosyncrasy. Before entering into the consideration of these, let us examine, briefly, the questions—do the effects of narcotics result from their direct influence on the nervous system? or is it secondary to their introduction into the circulation? These are points which have been long and strenuously agitated, and on which the most opposite opinions are maintained. There is no doubt that narcotics are in many instances received into the circulation, and that they are most active; indeed, so much so as to produce almost immediate death, when they are directly conveyed into it; as, for instance, by injection into the veins: yet even in this case their influence may be propagated by nervous communication, as we are led to conclude from the experiments of Messrs. Morgan and Addison, (An Essay on the Operation of Poisonous Agents on the Human Body: London, 1829,) who discovered that they produce in the sentient extremities of the nerves on the inner coats of the blood-vessels a peculiar impression which is conveyed to the brain along these nerves. This is also demonstrated by the rapid effects on every part of the system which follow their administration by the mouth; often in a space of time too short to be the result of absorption. It is also well known that, when the dose has been so large as to be suddenly followed by fatal effects, the whole quantity of the narcotic administered has been found in the stomach. Some striking objections, it is true, have been made to the conclusions drawn from the experiments of Mr. Morgan and Dr. Addison; but the explanation of the manner in which the effects of narcotics are diffused over the body does not rest on their experiments; the nature of the nervous system enables us to comprehend readily the manner in which this communication of impression is effected.

The primary action of narcotics is not confined to the nerves of the stomach; for if any narcotic, opium, or atropia, (the active principle of belladonna,) or daturia, (the active principle of stramonium,) for example, be applied to the surface of the body, the same results follow, although in a diminished degree, as display themselves, when they are taken into the stomach. If the application be made to an entire membranous surface, the energy of the narcotic influence is not in the ratio of the absorbing power of the surface; and if it be injected into the thorax, between the lungs

* These effects of narcotics on the alimentary canal are greatly modified by disease. In subacute inflammation, or a highly irritable state of the mucous membrane, vomiting is not unfrequently induced; in a relaxed condition of that membrane, the atony is augmented, and indigestion and constipation confirmed; in cancerous ulceration of the stomach, instead of allaying pain, narcotics cause pain, and excite vomiting and rigors, and the brain becomes powerfully affected. In irritable states of the intestinal canal, however, especially when spasm is present, they allay griping, resolve spasm, and produce an anodyne and salutary effect.

and the ribs, the action is more energetic than when the narcotic is taken into the stomach. The absorption, however, of narcotics cannot be doubted; and when a narcotic substance is applied to a wound, it is probable that in this case it operates chiefly by its absorption into the blood;* but although its influence can be impeded by a ligature on the blood-vessels, yet its operation does not essentially depend on its introduction into the circulation. When it is injected into the veins, the animal, as has been already stated, instantly expires, and this without convulsions. In this experiment all the muscles of the body are rapidly deprived of their contractility; and, therefore, the action both of the heart and of the respiratory muscles ceasing, death must necessarily follow. If these remarks be correct, it is evident that narcotics operate on the *brain* and the *spinal column* by entering the circulation when they are taken in moderate doses; but when they are swallowed in quantities sufficient to prove rapidly fatal, this effect is the consequence of their immediate influence on the nervous system; and when they are taken into the circulation, their effects may be still referred to the direct impression which they make on the nervous system. The nerves most particularly affected by narcotics are the respiratory; for when artificial respiration is maintained for some time in an animal poisoned by a narcotic, the animal recovers.

A question naturally suggests itself—how do narcotics produce sleep? Much difficulty attends the solution of this question; but some approach towards it may be attained by keeping in view the state of the vital functions during sleep. In this condition of the body, the pulse beats more slowly than when the person is awake; the temperature of the body is diminished, the perspiration is decreased, and nearly all the secretions are suppressed. Now on whatever principle narcotics act, if their primary stimulant influence is followed by a diminution of the force and frequency of the circulation, and at the same time of the respiratory effort, the change of the venous into arterial blood must be necessarily impeded; and this alone, by weakening the energy of the brain, will cause sleep. Such, at least, is the theory which the writer of this article is inclined to offer. It may be objected that this explanation applies equally to all the stimulants; and such is really the case, as all transitory stimulants, according to the extent of the dose, operate like narcotics, and produce sleep. But there is still something connected with the anodyne influence of narcotics which we cannot readily explain, and which requires a more intimate acquaintance with the nervous system than we at present possess.

Circumstances which modify the action of Narcotics.

1. *Nature of the Narcotic.*—The general effects which have been described as resulting from the administration of a narcotic are those which opium produces. When acetate of morphia is substituted for opium, and a full dose is administered, another symptom displays itself: the patient, when in the horizontal posture, is attacked with shocks, as if electrified; the head is thrown backwards as in opisthotonos; and a paralytic condition of the bladder of urine supervenes, although there is no diminution of the secreting powers of the kidney. If the muriate of morphia be employed, little or no excitant effect is perceived, whilst the sedative influence is most obvious. Belladonna, hyoscyamus, and aconitum, are more directly anodyne, and even in small doses affect the sight more than any other narcotics; and when the two former are overdosed, and delirium succeeds, it more resembles the delirium of intoxication than that of narcotism. Irregularity of arterial action characterizes the operation of conium, the pulse being in some instances sunk, in others increased to one hundred or more during the whole time of administering the medicine. When over-dosed, the breathing is more oppressed, and the thorax more constricted than with any other narcotic, while the countenance assumes the aspect of that of a man who has been strangled. Digitalis accumulates in the system, and veratria (colchicum *autumnale*) operates chiefly on the duodenum, producing copious bilious stools; thus lessening febrile action, and allaying pain.

2. *Extent of the dose.*—The influence of small and large doses of narcotics has been stated; and in many morbid states of the habit they may be employed to produce either stimulant or sedative effects. Unless the dose be large enough to diminish sensibility, they cannot be administered with the view of procuring sleep. In cases of inflammation, after the use of the lancet, large doses of narcotics are generally productive of the most salutary effects; on the contrary, small doses are likely not only to counteract the benefit derived from the bleeding, by their stimulant influence, but, if their administration be repeated, to augment the evil. In all painful and spasmodic affections, the extent of the dose is to be limited only by its effects: thus in tetanus, one hundred drops of the tincture of opium have been administered every hour with the best effect; and the writer of this article, in cases of gall-stones and renal calculi, has given upwards of eight hundred drops of the officinal tincture of opium in less than twelve hours, without any effect but that of relieving pain and aiding the passage of the concretions: indeed, narcotics may be persevered in to any extent, as long as they display no determinate action on the habit. The dose in such cases requires to be progressively augmented; if no relief be afforded in three or four hours, it should be doubled, and so on until the benefit anticipated be obtained.

3. *Period of the day.*—When narcotics are administered in the morning, especially on an empty stomach, considerable excitement is induced, and the anodyne and hypnotic effects of the medicine seldom follow; on the contrary, if the same dose be given in the evening, little excitement supervenes, and the desire of sleep is so great that it is impossible to avert it.

4. *Combinations.*—Narcotics, when uncombined with other substances, produce the effects already described; but in combination with many different substances, their operation is greatly modified. Thus, in conjunction with tonics, instead of checking chymification, they promote the appetite and favour the digestive function; aromatics oppose their sedative influence, and delay

* M. Lesieur of Paris applies narcotics to blistered surfaces in preference to their internal administration.

their soporific effect; combined with diaphoretics, whilst the function of the skin is augmented, their influence on the brain is diminished. Acids promote their powers; while alkalies, by decomposing their active principles, and withdrawing the acids which render their alkaloids soluble, diminish them, and in many instances render the narcotic inert. We shall notice these effects of combination in describing the individual narcotics.

5. *Habit.*—Narcotics lose their influence when they have been taken daily for a considerable time; and doses have been swallowed under such circumstances which would at first have proved fatal. This effect of habit in modifying the action of narcotics has not been satisfactorily explained, although M. Charvet has attempted it in reference to opium. He assumes that the state of congestion of the brain is admitted as the effect of an over-dose of opium, and supposes that the frequent use of the drug renders this less considerable; or that the brain, accustomed gradually to the flow of blood and resulting compression, at length is enabled to bear it with impunity, in the same manner as when a serous effusion gradually occurs, or a tumour is slowly developed in the brain. (*Charvet* de l'Action comparée de l'Opium.) There is much ingenuity in this explanation; but the power of habit in modifying and resisting the influence of some narcotics is not extended to all; and, indeed, there is little similarity of action among narcotics: each has its own specific or peculiar action on the nervous system, a circumstance which enables the physician to accommodate narcotics to the constitutions of his patient. This is peculiarly striking with respect to the anodyne and hypnotic properties of narcotics: after the failure of one, the administration of another will fulfil the intention of the subscriber, whether it is intended to allay pain or procure sleep. It is an equally curious fact, and one of practical importance, that this force of custom in reference to one narcotic does not render the system less susceptible of the impression of moderate doses of another: the opium-eater, accustomed to take a drachm of his favourite narcotic daily, may be lulled to rest by a few grains of henbane or conium.

It is unnecessary to mention many instances in proof of the extent to which the doses of narcotics may be carried with impunity by those who have long accustomed themselves to their use. Russell, in his History of Aleppo, states that Mustapha Shatar, an opium-eater at Smyrna, took daily three drachms of the drug, and felt a necessity for increasing the dose. Dhere, a French author, mentions the case of an officer of the same nation who took a drachm of pure opium daily, and appeared in good health, although an alvine evacuation was procured once only in eight days, sometimes once only in fifteen days. But no work affords so much curious information on this part of our subject, and so displays the extent to which the doses of some narcotics may be carried, as the Confessions of an English Opium-eater. It is, nevertheless, true that the habitual use of narcotics wears out the powers of life, and leads on to premature old age. The symptoms which follow the use of opium, for example, thus indulged in, closely resemble those brought on by excess in venery; marasmus and decrepitude supervene; the mind equally suffers; and the wretched individual sinks into the grave a deformed and slavering idiot.

6. *Age.*—The younger the person, the more energetic is the action of narcotics on the system; they even prove injurious to the fœtus, when they are prescribed to relieve cramps, or allay inquietude in the mother; thence the necessity of caution in administering them to infants, in whom both convulsions and epilepsy have followed their use.

7. *Sex.*—Narcotics exert a more powerful influence on women than on men, a circumstance which might, *à priori*, be expected from the greater susceptibility of the female constitution. To pregnant females, also, narcotics must be administered with the greatest caution, as in this condition of the female habit a state of the cerebral function frequently occurs, which is augmented by the operation of narcotics, and might be productive of dangerous consequences.

8. *Temperament.*—There is but one opinion respecting the power of temperament in modifying the operation of narcotics. In the *sanguine* temperament the nervous system is highly sensitive, and susceptible of every impression, and the body predisposed to inflammatory action. There can be no doubt that narcotics will produce a more powerful impression on such a temperament than on the opposite or *melancholic*. In those persons, for example, who are easily affected by wine, and in whom inebriety is quickly produced, a small dose of opium causes powerful cerebral excitement; thence the maxim of Tralles, "Illi vero omnes qui vinum non bene ferunt vix bene ferent opium." On the same account, a condition of habit likely to favour cerebral congestion is much more likely to be powerfully influenced by narcotics than a spare habit—a fact which ought never to be lost sight of in practice.

9. *Climate.*—The action of narcotics is powerfully modified by climate. The same dose of a narcotic which produces only beneficial effects in Great Britain, has been found to operate too powerfully in Italy; some attention is, therefore, necessary, in prescribing narcotics, to accommodate the doses to the nature of the climate in which the physician is practising. On the same principles, season modifies their action, and smaller doses are required in summer than in winter. These observations seem, nevertheless, at variance with the result of temperature on opium, the brain being less affected when the patient is kept in a temperature which excites perspiration than in one which is cooler. M. Hecquet (Vide Charvet de l'Action de l'Opium, p. 58) explains this influence of temperature in the case of opium, by saying, that as heat favours the flow of sweat, the opium is carried out of the habit with it, and is thus prevented from affecting the brain. Charvet supposes that, as copious sweating diminishes the mass of the circulating fluids, and renders the cerebral compression less powerful, the sweating may be regarded as a favourable crisis which guards the brain from over-compression. Both opinions are hypothetical; and it is more likely to depend on the greater irritability of the habit in warm climates than in cold, and the consequent greater susceptibility of impression.

10. *Idiosyncrasy* is more likely to influence the action of narcotics than any other classes of medicines. In some individuals opium, for example, even in moderate doses, produces restlessness, delirium, and convulsions; in others miliary eruptions; and in some its soporific effects are never experienced until the day following that on which it is taken.

With regard to the employment of narcotics, were it consistent with our plan to enter into the history of this class of remedial agents, we should remark on the very early period in which mankind appear to have been acquainted with their effects. In every nation, and among every people, from the southern islander, who chews the kava, and with his own saliva manufactures the intoxicating bowl, to the polished European, who indulges in the fermented juice of the grape, all seek in narcotics, not only oblivion from pain, but a balm for the cares and sorrows of life—"ducunt sollicitæ jucunda oblivia vitæ."

When narcotics are taken in over-doses, they produce the effects which have been already described: post-mortem examinations of the body display the brain gorged with blood; and not unfrequently water is found in the ventricles. In cases of supposed poisoning by narcotics, however, care must be taken not to confound the symptoms with those arising from diseases; in particular, apoplexy and epilepsy, which, as has been already stated, display symptoms closely resembling some of those attending poison by narcotics.

With regard to the *practical employment* of narcotics, it is obvious that they ought not to be prescribed in cases in which their primary excitement would prove hurtful, unless the dose be large enough to induce symptoms of diminished sensibility and lessened action without any previous excitement; and experience teaches us that this is the result when a large dose of a narcotic is administered, particularly when it is taken immediately after a copious abstraction of blood; but if the dose be small, the opposite effect follows, proving that the patient may be either greatly benefited or materially injured by the extent of the dose of the narcotic, which it may be thought proper to prescribe. Thus if, in a case of pleurisy, the pulse be hard, quick, and forcible, and the pain of the side so acute as almost to prevent even a half inspiration, if a free bleeding be resorted to, two grains of opium, in conjunction with the same quantity of calomel, and a quarter of a grain of tartar emetic, may be prescribed with the prospect of much benefit; but if half a grain only were ordered, not only would no advantage accrue from the narcotic, but the stimulant effect alone being obtained, the benefit of the bleeding would be counteracted rather than maintained, and the repetition of the dose would only increase the evil. In this respect the action of narcotics does not differ from that of direct stimulants. In all cases, therefore, of increased excitement, when pain or restlessness demands the administration of a narcotic, the dose should be sufficiently large to obtain at once its anodyne effect, without the primary stage of excitement.

[Narcotics, in full doses, are precious sedatives; and, as such, may be employed in many phlegmasiæ, even from the very onset of the disease. They are remedies that have been but little understood, and the idea, that they are, under all circumstances, stimulants, has occasioned them to be discarded in diseases in which they would have afforded signal relief.]

The stimulant influence of narcotics in small doses is frequently taken advantage of in the treatment of fevers of a low or typhoid state. The tincture of opium, for example, given in doses of ten minims at short intervals, augments the strength of the pulse, rouses the vigour of the system, and sometimes supports the strength.

Narcotics may be arranged under two distinct heads, namely, *direct narcotics* and *indirect narcotics*. Under the former may be placed all those substances which produce their effects by a direct impression on the nervous system, without necessarily entering the circulation: under the latter those which enter the blood before acting upon the nervous system; for even when they enter the circulation their influence is still exerted upon the nerves. The continental physiologists have made many experiments to ascertain the manner in which narcotics operate, and have deduced this inference, that the narcotic must be transmitted to the brain through the blood before it acts; but it is more probable that in full doses direct narcotics operate by an immediate impression on the sentient extremities of the nerves.

The number of narcotics is considerable, but the most valuable are *opium*, and the salts of *morphia, henbane, conium, belladonna, lactucarium*, and *camphor*. It is incompatible with the plan of this work to enter upon the natural history, chemical properties, and pharmaceutical preparations of these substances; it is to their importance and employment as remedial agents that we have to direct the attention of our readers.

Like all other narcotics, *opium* exerts a primary stimulant effect on the living system, whether it be introduced into the stomach or into the rectum, or injected into a vein, or applied to wounds or ulcers, or rubbed on the surface of the body. When taken into the stomach in a solid form, it undergoes partial digestion; this process separating, in a great degree, the active principles, the *meconate of morphia*, the *narceine* and *narcotina:* thence the salts of opium act more rapidly than the entire opium.* During the continuance of the

* The components of opium are—

1. *A volatile oil*, on which the odour of the drug depends, but existing in such small quantity that it can scarcely be procured in a separate form. Water distilled from opium contains it, and is productive of slight cephalagia when snuffed up the nostrils, but it displays no other narcotic property.
2. *Gum*, including *bassorine*.
3. *Extractive*, partly simple, partly unusually oxydized.
4. *Resin*, with which the colouring matter is closely combined; and this in conjunction with the volatile oil may be the source of the stimulant property of the drug.
5. *Caoutchouc*.
6. *Narceine*, a new principle lately discovered by M. Pelletier; it is crystallizable, is soluble in water and alcohol; insoluble in ether; and has a bitter styptic taste. Its action on the animal economy is unknown.
7. *Meconine*, another new principle, also discovered by the same able chemist; crystallizable; little soluble in cold water, but very soluble in hot water.
8. *Morphia*, in combination with meconic acid as a bimeconate.

stimulant effect of opium and its salts, the cuticular secretion is augmented, but some of the other secretions are diminished: the urine, for instance, is scanty and high-coloured; and after this state is over, the pale, clay-coloured aspect of the alvine discharges indicates a greatly diminished excretion of bile. The stimulant effects of a moderate dose of opium are soon dissipated; and the administration of a much smaller dose, after a short interval, produces more intense effects than the first dose, although the reverse of this follows the continued use of the drug. If the opium be taken on an empty stomach, the excitement is greater than when it is swallowed soon after a meal: in the first case the pulse remains small, although hard, and symptoms of cerebral congestion rarely appear; on the contrary, symptoms of congestion appear sooner, and are more obvious, if the same dose be taken just after a meal. From experiments made by Dr. Crump (An Inquiry into the Nature and Properties of Opium, &c. 8vo. 1793) and others, it is evident that the exciting influence of opium differs little from that of other stimulants; but the sleep which follows the excitement of wine and ordinary stimulants differs from that procured by the influence of opium; nor do these possess the power of opium in relieving pain: it is therefore fair to conclude that, in its sedative influence, opium is distinguished from all other stimulants.

Although it is probable that the effects of opium on the living system are attributable to its direct influence on the nervous energy, yet it must be admitted that there are facts which tend to shake this opinion; and one of the strongest is related by M. Barbier, from which it appears that an infant was affected by the milk of its mother, who had taken a large dose of the wine of opium. But as alcohol is undoubtedly taken up by the absorbents, it is probable that the absorption of the opium in this case is to be attributed to the vehicle; and it is only by admitting the direct influence of opium on the sentient extremities of nerves, that we can explain the relief obtained in instances of severe pain.

Many circumstances, as has been already stated with respect to narcotics in general, modify the operation of opium on the living system. The first of these is age: opium operates with most energy on the young, consequently the greatest caution is requisite in administering it to infants, in whom it often excites convulsions; even in the state of syrup of poppies, too often administered to infants by lazy nurses. A low irritative febrile state, depending on the continued cerebral excitement produced by the medicine, gradually brings on marasmus, and undermines the powers of the constitution. The influence of sex is less than that of age; but still experience has proved that women are more easily affected by opiates than men.

9. *Narcotina*, which has been supposed to be the stimulant principle of the medicine.
10. *Sulphates of lime and of potass.*
11. *A brown acid.*
12. *Lignine* or *woody fibre.*

[The most recent researches have shown, that it has at least the following constituents: morphia, narcotin, codeia, narcein, meconin, thebain or paramorphia, pseudomorphia, meconic acid, brown acid extractive, sulphuric acid, resin, fat oil, gummy matter, caoutchouc, albumen, odorous principle and lignin.—Pereira, *Mat. Med.* Amer. ed. ii. 716, Philad. 1843.]

The effect of custom in modifying the influence of opium on the system is so well known as scarcely to require it to be noticed. The extent of the dose to which it may be carried by those in the habit of taking it daily is wonderful, but still larger doses may be given to allay pain and spasm. Dr. Chapman mentions that, in a case of cancer in utero, he has given the tincture to the extent of three pints in twenty-four hours, without any other effect than that of relieving pain.

The combination of other substances with opium greatly modifies its action on the system. When combined with antimonials, not only are its diaphoretic powers increased, but it is rendered less likely to impede the other secretions. With acids, half the usual dose will produce the effects of a full dose, an effect evidently resulting from the production of a more soluble salt, the acetate, the citrate, the sulphate or the muriate of morphia, according to the acid employed. When we order it with the view of procuring sleep, we should not combine aromatics with opium, as these increase its stimulant, but lessen its sedative influence.

Morphia, the active principle of opium, exists, as we have already said, as a bimeconate in opium; but when it is separated from the other components of the opium, it is generally administered in combination with acetic, or muriatic, or sulphuric acid, as an acetate, muriate, or a sulphate.* Any one of these salts, when administered in doses of a quarter of a grain repeated at short intervals, causes a sensation of fulness in the head, some obscurity of sight, tingling of the ears, cephalalgia, vertigo, and a tendency to sighing and sleep. The pupils are sometimes dilated, at other times contracted, and sometimes are not at all affected; the pulse is not much accelerated: occasionally there is a sensation of itching all over the skin, frequently nausea, and a difficulty in passing urine. In large doses the cerebral excitement is alarming. From some observations made by M. Bailly, in the Hôpital de la Pitié in Paris, it appears that full doses of acetate of morphia sometimes excited shocks like those of electricity, when the person was lying in the horizontal position: the muscles lost much of their contractility, and the sight was greatly impaired. As, in these cases, the pulse was diminished both in force and frequency, Bailly was led to infer that morphia acts as a sedative on the heart, and as a stimulant on the nervous system; it would, perhaps, be nearer the truth to say that it acts as a stimulant on the nerves of sensation, and as a sedative on those of motion. It seldom increases the temperature, although sometimes its salts greatly aug-

* Acetate of morphia is thus prepared: a specific quantity of morphia dissolved in alcohol is saturated, accurately, with pure acetic acid; and the solution evaporated with the gentle heat of a vapour-bath to dryness. The sulphate is prepared in a similar manner, care being taken to employ the acid in a dilute state. The muriate may be readily prepared by precipitating an aqueous solution of opium by means of muriate of baryta; a meconate of baryta, which is insoluble and falls to the bottom of the fluid, and a muriate of morphia which is soluble, are obtained. By evaporation of the fluid, the muriate crystallizes in tussocks consisting of aggregations of acicular crystals; by pressing these between colourless blotting-paper, the narcotina is separated, and the muriate obtained in an impure crystalline state. It is purified by repeated solutions and recrystallizations. [For the different modes of preparing morphia and its salts, see Pereira, *Op. cit.*]

ment the exhalant function of the skin. In overdoses, whilst the upper part of the body is bathed in a viscid sweat, the lower extremities are cold; there are violent tremours; the body acquires a livid hue; the face has a pinched and cadaverous aspect; and death ensues without convulsions.

The *black drop* has all the progerties of acetate of morphia in combination with aromatics.*

From what has been said, it is evident that in prescribing opium we must always keep in view both its stimulant and its sedative influence.

[*Codeia.* The experience of different observers, as to the effect of codeia on the economy, has been discordant. Magendie (*Formulaire pour a préparations, &c., de plusieurs nouveaux medicamens, &c.,*) states, that it causes sleep, and, in large doses, stupor. He considers one grain to be equivalent to half a grain of morphia. A syrup, each ounce containing two grains of codeia, has been given in hooping-cough, and in other diseases in which opium has been found useful; and with Dr. Miranda (*Journal de Pharmacie*, xxiv. 145, Paris, 1838,) it has proved serviceable in what he terms "powerful nervous irritations of the mucous membrane of the stomach." It would not seem, however, to possess any virtues not contained in morphia, whilst its cost is excessive. (For the mode of preparing it, see the writer's *New Remedies*, 4th edit. Philad. 1843.)

Narcotin. The views in regard to the precise properties of narcotin are also contradictory; and owing to the uncertainty in regard to its action, it is but little employed. It would seem that the exciting properties of opium do not belong to it exclusively, as has been supposed by some, inasmuch as there are persons who are as disagreeably affected by morphia alone as they are by opium, which contains both morphia and narcotin. Recently narcotin has been employed as an antiperiodic. See TONICS.

The other constituents of opium are not of much, if any, therapeutical interest. Narcein, meconin, pseudomorphia, and meconic acid, appear to be inert; and, according to Magendie (*Op. cit.*), thebain or paramorphia, when injected into the jugular vein, or placed in the pleura of an animal, causes tetanus and death in a few minutes.]

Practical employment of Opium.—In *intermittent fevers* the employment of opium is as old as the time of Galen. The best time for administering it is an hour before the expected paroxysm, as at this time it weakens the force of the attack, and sometimes prevents its accession; a result probably due to its stimulant property, whilst, at the same time, its sedative quality allays the morbid irritability connected with ague. The dose should be large; for example, from forty to sixty minims of the tincture. When given during the hot stage, as Lind recommended, it renders that stage shorter and milder, lengthens the intermission, and greatly promotes the influence of bark or the sulphate of quinia in curing the disease. In combination with calomel, in doses of a grain of each, it also enhances the sanative powers of tonics, in cases which resist them when given alone. But if opium fail to check the accession, it should not be given in the succeeding paroxysms, as the repetition of it in such a case only tends to induce debility.

In *continued fevers* the use of opium is more questionable than in intermittents. It should not be ordered if the temperature of the surface be much greater than natural, unless there be a tendency to perspiration, which it accelerates, and thence proves beneficial. If pain and watchfulness demand its use, the dose should be large, and it ought to be united with calomel and tartar-emetic, a combination which greatly lessens its stimulant properties. In this combination and with James's powder, Dr. Currie employed it with great advantage after the cold affusion. In the advanced stages of typhus, opium is useful as a general stimulant, in doses of from six to ten minims of the tincture, or from three to six minims of the black drop, in combination with camphor and other cordials. When, in the early stage of continued fever, the pulse is full and hard, the heat of the surface greater than natural, the thirst considerable, and there is much headach, the use of opium is not admissible. Even in the sinking stage of this disease, wine is a better and more permanent stimulus. In typhus, the symptoms that chiefly indicate the use of opium are low muttering delirium, watchfulness without increased heat of skin, diarrhœa, and subsultus tendinum: the dose should be small, frequently repeated, and cool air freely admitted to the chamber of the patient. If the delirium, however, be accompanied with flushing of the face, impatience of light, and throbbing of the temples, it must not be administered.

If opium be prescribed to counteract watchfulness, it should be recollected that this may arise from very opposite causes. When it is accompanied with great heat of surface, restlessness, tossing about in the bed, and determination of blood to the brain, it proves deleterious; if none of these symptoms are obvious, then opium is the best means for overcoming such a state of watchfulness. It should be given in full doses, in a solid state combined with calomel, at the usual time of rest; and during its operation the scalp should be kept cool by enveloping the head in a cloth wet with a cold lotion. In low delirium it may be given at the same time as ammonia; but if, as sometimes occurs, it increase the delirium when it is taken into the stomach, then it may be applied by aid of friction dissolved in oil.

The best preparations of opium are the *tincture* of the pharmacopœias, the *black drop*, the *liquid laudanum of Sydenham*, the *solution of the muriate of morphia*, and the *acetate of morphia*.

With regard to the extent of the dose, it should be held, as a general rule, that double that which

* The black drop is prepared by rubbing half a pound of opium, reduced to powder, with four pounds of verjuice, one ounce and a half of nutmegs, half an ounce of saffron, and three ounces of sugar. These ingredients are fermented with yeast for six days; the fluid is then to be decanted, filtered, and inspissated in the air to the consistence of syrup. The strength of the black drop compared with that of tincture of opium is as three to one. An excellent preparation, which owes its activity to the citrate of morphia, is ordered to be thus prepared in the Brunswick Pharmacopœia. "Dissolve four ounces of opium in forty-eight ounces of water, acidulated with six ounces of lemon-juice; filter and evaporate to the consistence of an extract in a water-bath." The citric acid, in this case, decomposes the bimeconate of morphia, and affords a more soluble salt, the citrate of morphia, which is conjoined with the gum and extractive of the opium.

is required to produce sleep in a state of health should be administered in disease; if acetate of morphia be preferred to any of the other preparations, when narcotic not hypnotic effects are desired, the following formula will be found useful:

℞ Morphiæ, gr. ii.
Acidi acetici, *m* ii.
Misturæ amygd. amaræ, f.℥vi.
Syr. tolutani, f.℥i.

Tere morphiam cum acido et syrupo, dein adde misturam. Sumatur quarta pars sextâ quâque horâ.

In the *phlegmasiæ*, notwithstanding the general rule that opium should not be administered during the presence of active inflammation, until the system have been relieved by bleeding, there are cases in which it proves highly useful; as for instance, when the inflammatory action is of a passive kind, as in malignant ulcerated sore throat, and in chronic rheumatism. But even when it is of the opposite description, as in pleurisy, if venesection be freely employed, nothing is so likely to subdue permanently the inflammatory action as large doses of opium in combination with calomel and tartar-emetic. When the inflammation is in the substance of the lungs, as soon as dyspnœa is relieved, and the symptoms are reduced to cough and restlessness, opium may be given with the hope of the greatest advantage: indeed, all acute inflammatory affections of the chest may be benefited by opium thus preceded by antiphlogistic measures. In peripneumonia notha, both in that variety which constitutes the catarrhus suffocativus of old age, and that in which there is a congestion of blood in the pulmonary vessels, opium is useful. In the first place it forms an active and useful ingredient in stimulant expectorant mixtures, with ammoniacum and squill; and in the second, after the congestion is partially relieved, the liberal administration of opium in combination with demulcents is productive of much benefit. It may be said that this opinion is at variance with the common idea that opium retards expectoration; but in reply to this objection, let us examine what the state of the chest is in pneumonia. We find that the pain is aggravated by a full inspiration, and that, in order to obtain this, the patient must be nearly in the erect posture. Now, under this state the necessary change cannot be effected on the blood; and in the irritable state of the bronchial membrane the secretion of its natural mucus is hurried, and the sputa consequently thin and acrid. In this condition, opium, acting through the pneumogastric nerves, allays pain, and enabling the patient to take a fuller and more perfect inspiration, it is easy to comprehend how a thicker and more slowly secreted mucus will be coughed up more easily than a thinner and more irritating matter. It is on this account that opium, instead of restraining, frequently promotes expectoration.

[In many of the phlegmasiæ, opium is a most valuable sedative, even from the first onset of the disease. In sero-enteritis, it was highly extolled by Armstrong, (*Lectures on the Morbid Anatomy, Nature and Treatment of Acute and Chronic Diseases*, Amer. edit. Philad. 1837,) especially when given after bleeding had been practised; and he was in the habit of saying, that if he himself were labouring under the disease, and were told that he must rest his hopes of recovery on the lancet singly, or on opium singly, he should be disposed to select the latter.

What Armstrong said of the use of opium in these cases has been extended to similar pathological conditions in other serous tissues and elsewhere; and many advantages have accrued from its employment, in some form of preparation, in cases in which, at one time, its use was unknown, or considered inappropriate. Dr. Christison, (*Edinb. Monthly Journ. of Med. Science*, Feb. 1841, p. 91,) has recently shown, that coryza, catarrh, influenza, and dysentery may be frequently cut short by a full dose of it; and that when conjoined with ipecacuanha, it has often the same effect on common sore-throat, catarrh and acute rheumatism. He also is a great advocate for the full employment of opium early in inflammations after a deep impression has been made by bloodletting.

The common remark, that opium is so well adapted for cases of pneumonia, bronchitis, &c. because it "diminishes the secretions," appears, as the writer has said elsewhere, (*General Therapeutics and Materia Medica*, i. 337: Philad. 1843,) a faulty method of explaining its action. The suppression of secretions is not a pathological condition; it is only the symptom of such a condition—and when it is stated, that the indication is "to restore the secretions," if the expression have any meaning at all, it can only convey the idea, that the pathological condition, which occasions their suppression, must be removed. Now, we know, that the first effect of the inflammation of a mucous membrane is a diminution of its natural secretion; and that, after the inflammation has continued for a time, an increase of the secretion takes place; but it is no longer of the normal character. It is a secretion effected by vessels labouring under inflammatory excitement. Two opposite effects, then, on the secretory function are produced by different stages of inflammation. Yet the indication in the two cases must obviously be identical. It must be—to remove the pathological condition of which these effects are symptomatic. A narcotic, in appropriate doses, is a sedative; it is, therefore, well adapted for allaying inflammatory excitement.

A knowledge of these properties would suggest the propriety of its employment in the diseased state of mucous membrane referred to above; and experience ought to show, as it daily does, that in the early period of inflammation of a mucous membrane it will, in sedative doses, "restore the secretions;" and at a later period, when the mucous secretions have become profuse and morbid, it will diminish them, by diminishing the inflammation that occasioned them. It is obviously, therefore, incorrect to lay down the broad law, that "opium diminishes the secretions," and that its use is improper whenever the indication is "to restore the secretions." Such an indication ought never to be imagined. It is unmeaning, and can only have been suggested in an ignorance of true pathology; and the writer is happy to find, that his views on this subject have met with the entire accordance of others who have investigated

the subject pathologically and practically. "The objection to the use of opium in the treatment of bronchitis, pneumonia, &c. on the ground that it diminishes the secretions," says a recent therapeutical writer, Dr. Spillan, (*A Manual of General Therapeutics*, &c. p. 155: Lond. 1841,) has been happily refuted by Dr. Dunglison."]

Opium is indisputably a most useful medicine combined with ipecacuanha, or camphor, or ammonia, as circumstances may require, in malignant peripneumony. In ophthalmia it is exhibited under the same restrictions as in pneumonia. If pain and irritation be excessive, it may be given even before bleeding has been resorted to, in which case it should be combined with calomel and tartar-emetic. Externally no application is more useful, after the active inflammation has been subdued by topical bloodletting. The old *solutio opii vinosa* is preferable to the vinum opii of the modern pharmacopœias, as it contains only half the quantity of opium and an aromatic. It acts partly by its stimulant, partly by its narcotic properties.

Opium has now almost supplanted the use of the lancet in acute rheumatism: it should be administered in full doses, immediately after active purging, in combination with colchicum. In the chronic form of the disease the opium may be combined with sulphate of quinia, or with infusion of menyanthes *trifoliata* acidulated with muriatic acid, which gives activity to the opium by forming a muriate of morphia.

In gout, even in that variety of the disease which is named retrocedent, opium is truly our sheet-anchor, and it must be given in full doses. In some cases it has been administered in doses of ten grains twice a day with advantage; and no consequent inconvenience is experienced if the dose be not too hastily lessened. In the acute form of the disease, opium is most useful when combined with colchicum. Something in this combination is due to the specific action of the colchicum on the gall-ducts. It has been supposed that the opium diminishes or impedes the biliary secretion, because the evacuations which follow a dose of opium are frequently pale; but this only indicates a diminished excretion. In the lower animals poisoned by opium the gall-bladder and ducts are turgid with bile, although very little had found its way into the duodenum. Now, as colchicum stimulates the gall-ducts, the combination of this remedy with opium removes the objection to its employment in gout, as far as regards the biliary secretion.

It is almost unnecessary to say that in cases of biliary calculi impacted in the gall-duct, or in nephritic inflammation arising from the irritation of renal calculi, either in the pelvis of the kidney or in the ureters, the best results are to be anticipated from the use of opium, particularly when the stomach is so irritable as to reject, by vomiting, every thing received into it. In this case, on account of the advantages to be expected from proximity of action, the opium is most beneficial when exhibited per anum, dissolved in oil. In suppression of urine, also, from calculi irritating the bladder of urine, or from stricture of the urethra, opium in combination with calomel is the medicine most to be depended on; and the same combination acts as a powerful anodyne in chordee, and the painful micturition of gonorrhœa. Neither large doses of opium alone, nor large doses of calomel, produce the effect of the combination of these medicines. Two grains of each may be administered in the form of a pill every second or third hour. The writer of this article, however, has sometimes found it better to order eight grains of calomel and two of opium, to be taken every eighth hour until relief was obtained.

Small-pox is the disease among the exanthemata in which opium is most decidedly indicated; and we are indebted for this fact to the sagacity of Sydenham. In the distinct form of the disease it is not required unless convulsions occur, or the eruptive fever be accompanied with much restlessness. Perhaps the practice of Sydenham, of administering opium every night in confluent small-pox, has been too indiscriminately followed. It is not required in the greater number of cases during the progress of the eruption, although it is occasionally useful for promoting the maturation of the pustules; and after the eruption it is indicated, under the same circumstances as in typhous fever, in conjunction with cinchona bark and wine. It is also useful in the secondary fever, if diarrhœa supervene; for notwithstanding the authority of Sydenham, purging at this time ought to be restrained to a certain extent. In measles, the employment of opium is contra-indicated in the commencement of the attack, but after the inflammatory symptoms are subdued, and the cough remains, then opium in combination with calomel and ipecacuanha will be found beneficial, and still more so if the diarrhœa, which to a certain extent is useful, proceed too far. In that form of the disease which is of a malignant nature, rubeola *maligna*, as the fever is of the typhoid type, opium is indicated, and may be given throughout the attack, under the same regulations as in typhous fever.

Much difference of opinion exists respecting the employment of opium in hemorrhages. When febrile symptoms exist, these should be subdued before opium is prescribed; when the hemorrhage is connected with much debility, laxity of the solids, and a thin state of the circulating mass, then opium in combination with astringents and tonics should be administered to allay the irritability which always accompanies this state. In hæmoptysis, when no inflammatory state of habit exists, when the bleeding is kept up by cough, and is accompanied with watchfulness, opium is likely to prove useful: in the opposite state, if much irritation exist, it should be combined with either digitalis, or acetate of lead, or hydrocyanic acid, and cold both topically and generally applied.

In phthisis pulmonalis opium is administered to allay cough, and to moderate diarrhœa when it is present. If the accession of the hectic paroxysm be well marked, it should be given at that period. It is usually administered at bed-time; but as it is apt to excite much perspiration, it is preferable to defer it until early in the morning, when the cough is most severe. The soluble salts of morphia, especially the acetate, are preferable to opium, as they do not excite perspiration in small doses. The following formula will be found very serviceable:

℞ Acidi acetici diluti (aceti dest.) f.℥iv.
Acetatis zinci solut. P. E. f.℥i.
Tinct. opii *m.* xii.
Decocti lichenis Islandici f.℥xi. M.
Haustus quintâ quâque horâ sumendus.

In no disease has opium been more frequently employed than in dysentery; but there is much difference of opinion as to the propriety of this practice. If pains and tenesmus continue after the bowels have been freely evacuated, opium, combined with ipecacuanha, will be found useful; but during its use the bowels should be freely evacuated once at least in twenty-four hours. When the tenesmus is very urgent, the opium should be exhibited, in conjunction with demulcents, in the form of enema; and towards the close of the attack, when the disease may be regarded as having passed into diarrhœa, opium is the proper remedy. In bilious colic, and some other affections of the bowels in which pain and spasm arise from the action of highly irritating matters on the coats of the intestines, and in which purgatives do not act freely, experience has proved the propriety of combining opium with purgatives. In conjunction with calomel in large doses, it allays the irritation both of the stomach and the intestines, removes spasm, and consequently aids the operation of the purgatives. Indeed, in almost all spasmodic affections opium is the remedy to be relied upon, whether the spasm arise from the action of some irritating substance on the moving fibre, or from irritation kept up by debility: the cure consists in removing the irritating cause, and diminishing the susceptibility of the muscular fibre by restoring its tone. The term "almost all" is employed, because in some spasmodic affections opium seems to produce deleterious effects: thus in hay asthma it augments fever, headach, and the wheezing and suffocative tightness across the chest, which characterizes that singular disease. To answer both the above intentions opium is admirably adapted, when it is given in combination with sulphate of quinia and other tonics.

In idiopathic tetanus, opium is a remedy of great power; in traumatic tetanus it is of less value even in the largest doses. In the idiopathic form of the disease, opium should be early administered, as the progress of the attack is rapid, and the power of deglutition may be soon lost. The extent to which the remedy may be given is limited only by its effects; many ounces of the tincture have been taken before its effects have been felt. Its stimulant influence quickly disappears, on which account, even after the spasms are controlled by it, the use of it should not be discontinued for some time. A case is recorded in which fifteen hundred grains of solid opium were taken in the course of seventeen days; and another in which twenty fluidounces of the officinal tincture were swallowed in twenty-four hours: both cases recovered. In general, the following rules should regulate the progressive increase of the dose, and its repetition. If the spasms be moderate, ten or twelve minims may be given every hour; but if no relief be afforded in three or four hours, the dose should then be doubled, and so on progressively until the expected benefit be obtained, after which the dose should be diminished in the same ratio. No intermission should be permitted whilst the spasms continue. When deglutition is impeded, the opium should be administered per anum, and a solution of it in oil be rubbed upon the spine. Much advantage is derived from rubbing this oily solution on the jaw in trismus — a proof of the direct influence of opium on the nervous system.

In epilepsy, except in cases which are kept up by habit, after the removal of the irritation which first caused the convulsions, opium is not useful. In such cases a large dose is required to break the habit, but a purgative should be given at the same time, as in no disease is costiveness so injurious. The old physicians, even Sydenham, relied much on the influence of opium in chorea; and if the attack be complicated with hysteria, after the bowels have been freely opened, it frequently proves useful. But the plan of treating chorea with powerful purgatives, and afterwards with the carbonate of iron or with the nitrate of silver, is so successful as to leave us little to regret, should opium fail altogether in relieving the disease. In another painful affection also, tic douloureux, opium has so frequently disappointed our hopes, that more reliance is placed on the influence of tonics than on narcotics in this disease.

The watchfulness of maniacal patients early led to the use of opium in cases of insanity: the only objection to its employment is its tendency to cause costiveness; but this is obviated by combining it with aloetics, which operate on the bowels without weakening the soporific power of the opium conjoined with them. By procuring sleep, and thereby severing the catenation of morbid sensations, opium is often highly beneficial in insanity, especially that form of it which is produced by habitual drunkenness. In these cases there is generally a pallid countenance, a cold clamminess of the surface, and other symptoms indicative of great debility, accompanying the want of sleep; under which circumstances the question of life or death is often involved in administering or withholding the use of opium, and in no situation can the judgment and discrimination of the practitioner be more seriously employed.

[The writer's experience has shown, however, that although opiates are trusted to almost solely by some in delirium tremens, they are rarely, or never, indispensable; the disease generally yielding to a proper eclectic and almost expectant treatment. For his experience in the matter, see his *Practice of Medicine*, vol. ii. 277, 2d edit. Philad. 1844.]

In syphilis, opium has been used as the sole means of cure; but although experience has demonstrated that opium cannot be relied upon for this purpose, yet as an adjunct to mercury it is of great value: it enables the system to bear a large quantity of mercury with impunity, and also allays the state of morbid irritability which frequently remains after the cure of syphilis, and, consequently, favours the return of health.

In diabetes mellitus, opium has a powerful influence in restraining the quantity and moderating the saccharine quality of the urine. The dose must be carried to a considerable extent to effect this purpose, to six or eight grains in twenty-four

hours; but too often the evil returns as soon as the dose is diminished. In one case recorded by Dr. Warren, (Transactions of the College of Physicians, vol. iv.,) five grains of solid opium were taken four times a day with evident advantage. Its beneficial influence has been referred to its augmenting the action on the skin, and consequently diminishing that of the kidneys; but as other diaphoretics do not cure diabetes, this theory of its operation is not satisfactory.

Besides the benefit arising from the employment of opium in the diseases already noticed, advantage is also taken of its administration in many morbid states of the system, to lessen irritation, to relieve pain, and to induce sleep; and undoubtedly, whether it be taken into the stomach or applied to the surface of the body, its place for these purposes can be supplied by no other substances. But, like some of the choicest gifts of Providence, it is abused and frequently employed as a poison, and this statement might be closed by tracing the symptoms produced by an over-dose of opium or of its salts, and pointing out the remedy; but for this information we must refer our readers to the article Toxicology.*

Digitalis is generally regarded rather as a diuretic than a narcotic, but under certain states of habit it exerts a decided and important narcotic influence. It operates directly upon the nervous system, producing first stimulant and afterwards sedative effects. This influence of foxglove was first satisfactorily observed by Dr. Hallaran in a case of insanity, in which the tincture of foxglove was given by mistake for the tincture of opium, and from the effects which presented themselves, he was led to conclude that foxglove cannot be advantageously exhibited under "the pressure of high arterial action;" a fact which, indeed, might have been inferred from the repeated observations of its uselessness as a diuretic in dropsy, when an inflammatory state of the habit exists. Dr. Hallaran, taking advantage of his accidental discovery, employed opium as a narcotic in cases of mania, attended with diminished excitement, and the benefit was such as to enable him to remark regarding it, "I am encouraged to proceed with as much confidence in the hope of recovery, as I would in cases of lues, from the mercurial influence." "Insane persons," he adds, "have repeatedly assured me, on approaching to recovery, that they within a very few minutes have had a consciousness of relief, both as to mental and corporeal sensations, from the use of digitalis. One in particular, who for a time had been intent on self-destruction, declared to me that the propensity was never present so long as its efficacy had remained." (Practical Observations on the Causes and Cure of Insanity, by W. S. Hallaran, M.D. p. 107–8.) The mode of administering digitalis in mania is to commence with ten minims of the tincture for a dose, three times a day, in a glass of water, and to add two minims to every dose until sleep be procured, or until nausea or vertigo be experienced, in which case its use should be instantly laid aside, and ammonia and cordials with opium liberally substituted. In this manner Dr. Hallaran has carried the dose "to one hundred drops with safety and advantage;" and the writer of this article has frequently carried it to sixty minims three times a day, with no other result than sleep, quiet, and the restoration of the patient to sound health and intellect. The best form of the medicine for producing these desirable effects is the tincture, made with the recently dried leaves, collected in June, in dry, warm weather, and dried without artificial heat.

In phthisis, digitalis acts also as a narcotic, but it is fitted rather for the advanced than the early stage of the disease. M. Neuman, of Berlin, has extolled its influence as a narcotic in chronic catarrh, when this depends on a state of erethism of the mucous membrane of the bronchi. He gives it in the form of infusion, made with ʒii. of the dried leaves in f.ʒvi. of boiling water, one table-spoonful of which is administered every hour, until nausea, or a sensation of constriction of the throat, or irregular pulse, supervene. The use of the medicine is then suspended for a week, and again renewed if the disease be not removed.

During the use of digitalis its sedative power on the circulation is to be carefully attended to, and its accumulation in the system closely watched, as by carrying it too far and producing extreme debility we may endanger the life of the patient. When the symptoms of poisoning display themselves, (see Toxicology,) in addition to the means already recommended for counteracting them, much benefit will be obtained from the application of a blister to the pit of the stomach. From the difficulty of preserving foxglove leaves so as to retain their active properties, the infusion is a bad form of preparation, and the powder should not be employed unless it retain the beautiful green colour and the peculiar odour of the recently well-dried plant. In prescribing the tincture also, it must be borne in recollection that the bichloride of mercury, corrosive sublimate, and nitrate of silver, are incompatible with it.

Henbane, hyoscyamus *niger*, is very generally employed as a narcotic in all the cases in which opium has been found beneficial. Its active principle is supposed to be an alkaloid, which has been obtained in a separate state, and named *hyoscyamia;* it is taken up both by water and alcohol. The forms in which henbane is administered are tincture and extract. The formula of the London Pharmacopœia for the preparation of the tincture is adequate for every practical purpose; that for the extract might be improved. Mr. Plumbe has procured an extract by macerating one part of the dried plant in four parts of alcohol for four days, filtering the tincture, and evaporating to dryness in a water-bath; it has a beautiful green colour, and retains all the active properties of the plant.

As a narcotic, henbane is analogous to opium in its effects. It operates directly on the nervous system, augmenting the force of the pulse, and increasing the heat of the skin before it produces sleep. It neither confines the bowels nor affects

* The best works on the nature and properties of opium and its salts are those of—Dr. *Christen:* Opium historicè, chemicè, atque pharmacologicè investigatum, 1820.—M. *Charvet:* De l'Action de l'Opium et de ses Principes constituans sur l'économie animale, Paris, 1826.—Dr. *Crump:* On Opium, 8vo. 1788.—Dr. *Leigh:* Experimental Inquiry into the Properties of Opium, 1786.—*Wilson:* Experimental Essays, 1795.—*Degnise, Dupuy,* and *Leuret:* Recherches et Expériences sur les Effets de l'Acetate de Morphine, 8vo. Paris, 1824.

the brain so much as opium. In large doses, however, it operates as a virulent poison, and in some habits excites a pustular eruption.

Although henbane was employed as a narcotic by the ancients, yet Stoerk first investigated its value. He employed it in all painful diseases; and owing to its tendency to relax the bowels, it has been found very serviceable in ileus and colica pictonum, in combination with colocynth and scammony. Mr. Brande recommends it as well adapted for allaying the pain and irritation caused in the kidneys by red gravel. Smoking the leaves in the manner of tobacco, soothes the pain of toothache and relieves the dyspnœa in spasmodic asthma. When applied to the surface, in the form of extract, it dilates the pupil; and much comfort to the feelings of the patient is derived from henbane in the form of a poultice in scrofulous ulcers and open cancer.

The tincture is the best form of administering henbane; but it is most frequently employed in the form of extract. The dose of the tincture is from *m.* xv. to f.ʒiss; that of the extract, from *gr.* ii. to *gr.* xii. Alkalies destroy its narcotic properties; they consequently are incompatible in prescriptions with it, and may be employed as antidotes, when it displays poisonous effects either from an over-dose or from idiosyncrasy.

The results of Stoerk's employment of *conium* in cancer and fistulous sores, recommended it as a narcotic to the attention of modern practitioners. It possesses considerable narcotic powers; but so much depends on the drying and preservation of the leaves, either in their entire state or in that of powder, and on the preparation of the extract, as well as the state of the patient at the time of its administration, that few narcotics have perplexed practitioners so much as conium, and to these causes we must attribute much of the varying opinions respecting its influence as a remedial agent. Keeping these facts in view, conium has been found useful in acute rheumatism, scrofula, syphilis, and especially in cancer, the pain and irritation of which are supposed to be more effectually under the control of conium than of any other narcotic. In these cases the dose should be gradually increased until indications of an overdose begin to display themselves. These are nausea, dimness of sight, headach, drowsiness, vertigo, acceleration of the pulse, sweating, dryness of the mouth, diarrhœa, and, if the system be not relieved, coldness of the extremities, sinking of the strength, and a fatal result. Some, not all, of these symptoms usually present themselves before any perceptible beneficial change in the diseases which have been named is effected by conium. In many of the cases in which conium has proved beneficial, its use has been continued for some time, and the cure has proceeded in the direct ratio of these sensible effects. On this account, the dose of conium requires to be progressively augmented until the symptoms of its influence be sufficiently obvious. The pulse in some instances sinks; in others it is maintained full, and at 100 or more, during the whole time of exhibiting the medicine. Sometimes the function of the kidneys is augmented; sometimes that of the skin; sometimes no effect is produced on the sensibility of the habit; occasionally this is greatly diminished. In that variety of paralysis which is complicated with rheumatism, in which deficiency of motion is attended with acute pain, conium has been found highly beneficial. In six cases of this affection treated with conium in the Edinburgh Infirmary, by Dr. Home, three were relieved and three were cured, although two of them were of long standing, and one in an old person. We have witnessed much benefit derived from it in chronic rheumatism, in keeping down pain; and in chronic sciatica, our experience authorizes us to say that it is more to be depended on than any other narcotic. In intermittent cephalea, conium has been found to be an excellent adjunct to tonics. In scrofula, notwithstanding the testimony of Stoerk in its favour, we have not been able to perceive that it effects more than any other narcotic; and except in soothing the cough, the same character may be bestowed upon it as a remedy in phthisis. In over-doses, besides the symptoms already mentioned, its effects greatly resemble those of opium.

The extract, which is the only preparation of conium in the London Pharmacopœia, is a bad form of the medicine, owing to the difficulty of preserving it; whenever a saline crust appears on the surface, it is no longer of any value. The tincture of the Edinburgh and the Dublin Pharmacopœias is a better form of preparation. We have found it particularly useful, when administered in combination with hydrocyanic acid in a light decoction of cetraria Islandica, in long-protracted hooping-cough, accompanied with much debility, and when the cough is kept up by habit. The dose of the extract is from *gr.* i. to *gr.* vi.; that of the tincture from *m.* x. to *m.* xl., in any bland vehicle.

The atropa *belladonna*, deadly nightshade, possesses considerable influence as a narcotic, and some peculiar properties which require to be noticed. According to the analysis of a distinguished German chemist, M. Brande, its active principle is an alkaline substance, which he has named atropia, and which, in combination with other sulphuric or muriatic acids, is procured in beautiful white prismatic crystals, possessing in a concentrated degree the powers of the plant. The preparation most employed is the extract, which, however, is a very uncertain medicine, unless it be prepared in vacuo, the atropia being volatile and exhaled during the evaporation of the infusion. Belladonna, in whatever form administered, requires to be given in minute doses at first, and then to be gradually augmented until symptoms of its influence on the system become apparent. These are dryness of the throat, vertigo, dilatation of the pupils, slight dimness of sight, extravagant delirium, and an eruption on the skin, closely resembling that of scarlatina.

The efficacy of belladonna has been well ascertained in painful and spasmodic affections: in hooping-cough it has been found useful in doses of an eighth of a grain, gradually increased until the sight is affected, and a scarlet eruption overspreads the skin, accompanied with some degree of headach. Whilst these symptoms continue, the cough ceases, but returns as they disappear; but by renewing this state, and maintaining it for a sufficient length of time, the disease

is always shortened. In neuralgia, both internally administered and externally applied, belladonna has been advantageously employed. The influence of the extract on the radiated fibres of the iris, so as to dilate the pupil, was first proposed as a method of facilitating the extraction of cataract by Professor Reimarus; and for the same reason it is frequently employed for aiding vision during the progress of cataract. A small quantity of the extract, softened with water, is applied upon the eyelid: in a short time the pupil dilates, and the effect continues for many hours. An ointment formed with ʒi of the extract, and ʒvii of lard, affords great relief in the pain of hæmorrhoids; and in chordee when rubbed upon the perineum: the powdered leaves, sprinkled upon cancerous sores, greatly abate the pain of these ulcers. The narcotic influence of belladonna cannot, indeed, be justly depreciated. In prescribing it, alkalies should not be combined with it, as they render the medicine inert; and the same result takes place when the atropia is converted into a tannate, by administering any of the preparations of belladonna with astringent vegetable decoctions or infusions. Dr. Reisinger has proposed to employ atropia, instead of the extract or the infusion of belladonna, on the ground that it exerts a direct sedative influence on the nervous energy, whilst the extract and the infusion exert a primary, stimulant power, like other narcotics.

Belladonna, when given in over-doses, produces such an effect on the stomach that the organ rapidly ceases to be excitable by emetics. Under such circumstances, the advantages of the stomach-pump are great; for it is obvious that, notwithstanding the paralysed state of the organ, we may produce much mischief by inconsiderately augmenting, beyond a certain point, the dose of an emetic.

Like every other narcotic, the activity of belladonna depends greatly on the manner in which it is prepared: in general, so little care is bestowed on the preparation of the extract, that it is difficult to apportion the dose. When the evaporation is conducted in vacuo, as recommended by Mr. Berry, the dose must be considerably less than that usually prescribed.

[*Stramonium, James Town Weed, Thorn Apple*, produces effects like those of belladonna, when taken in large doses. In medicinal doses, it resembles hyoscyamus; but it is not often used internally. In nervous asthma, the smoke is often inhaled with advantage. The leaves are also applied, warm, to painful tumours, irritable ulcers, &c. The extract dilates the pupil, and is employed in the same cases as the extract of belladonna.

Aconite, the leaves of *Aconitum Napellus* and *A. Paniculatum*, Wolf's Bane, or Monkshood, is occasionally used as a narcotic, especially in the form of tincture,—taken internally, and applied externally to the part, in rheumatism and neuralgia. As a sedative, too, it has been prescribed in hypertrophy of the heart. The author has derived great advantage from it, employed in this way, in some obstinate cases of sciatic neuralgia.

The active principle—*Aconitia*—is a most virulent poison, which has been used in similar cases. It is, however, exceedingly expensive, and the drug possesses no virtues over the tincture of aconite. (*New Remedies*, 4th edit. p. 40: Philad., 1843.)

Veratria, the active principle of the seeds of *Veratrum Sabadilla*, *V. officinale*, *Helenias officinalis*, and *Asagræa officinalis*, which are known in commerce under the name *Cebadilla*, *Cevadilla*, or *Sabadilla*, is, like aconitia, a most virulent acro-narcotic. It has been prescribed, internally and externally, in the same cases as aconitia; but its employment demands great caution.]

The genus *lactuca* yields a white proper juice, which has much of the properties, at least of the sensible properties, of opium. When inspissated, this juice, procured from the lactuca *sativa* and lactuca *virosa*, is the lactucarium of the Edinburgh Pharmacopœia. The narcotic properties of lettuce were very early known: Galen, who in the decline of his life suffered from watchfulness, found much comfort in eating lettuce in the evening; and every one who has indulged the same luxury must have experienced the soporific effects of this plant. Dr. Coxe instituted a set of experiments, to ascertain how far lactucarium resembles opium in its medicinal effects; and his results were confirmed by the subsequent experiments of Dr. Duncan. Dr. Coxe's experiments led him to regard lactucarium as precisely the same as opium in its medicinal properties; but although it may be employed as a substitute for opium, in persons who from idiosyncrasy cannot take opium without suffering, yet its properties are not exactly the same. In our opinion, it is one of those substances which may be well spared from the Materia Medica, as the same effects which it produces can be obtained from modified doses of opium. [Its virtues have, in the writer's opinion, been greatly exaggerated.]

Camphor is a narcotic, [?] which, like opium, possesses both stimulant and sedative properties: when it is taken into the stomach in moderate doses, it exhilarates, but in large doses excites nausea, vomiting, and even inflammation of the organ. It is so penetrating, that, independent of absorption, it seems to pervade every part of the frame. It displays its stimulant and sedative powers in nearly the same manner as opium, the stimulant effects always preceding its sedative operation. Its influence is exerted directly on the nervous system, producing sleep and relieving pain; and this is so very powerful that people employed to open packages of camphor have occasionally fallen asleep. As a stimulant, camphor is extremely diffusible, its influence being rapidly extended over the system, and disappearing sooner than that of any other narcotic: it is, therefore, well adapted for procuring a sudden and transitory excitement, in cases in which this is required, and in which its continuance would prove hurtful. When it is intended that it should exert a stimulant influence, like opium, it should be given in small doses, and repeated at short intervals: when its sedative effects are required, it should be administered in large doses, and at considerable intervals.

Camphor may be employed in every kind of fever: in intermittents, during the paroxysm, to allay irritation and procure sleep; in continued fever, to subdue spasmodic twitchings, calm deli-

rium, and remove watchfulness; but in these respects it is inferior to opium. It is, however, an agreeable and useful adjunct to opium in fever. In the phlegmasiæ, camphor is frequently prescribed on mistaken principles, under a conviction that its primary action is sedative. Thus, in ophthalmia, it is sometimes prescribed as an external application in the inflammatory or active stage of the disease; whereas it is only suited for that passive state which is the result of the scrofulous diathesis, and old chronic inflammation of the conjunctiva.

In the exanthematous fevers it is useful for promoting the eruption, and restoring it when it has receded: in confluent small-pox in particular, attended with much of the typhoid character and with petechiæ, it aids in maintaining the powers of the constitution, and the maturation of the pustules; abating the tendency to convulsions which frequently accompanies this form of the disease. One curious result of the external use of camphor is stated by Rosenstein: he says, that if the skin be smeared over with a camphorated ointment, no pustules will appear. In spasmodic affections, camphor may be administered so as to act either as a stimulant or sedative; but in either case it is inferior to opium. In mania, the powers of camphor have been greatly overrated; it lowers the pulse of furious maniacs sometimes to fifty, and an evident sedative effect follows, but without any diminution of their sufferings. "By its duration," says Dr. Hallaran, "the countenance eventually assumes a livid aspect; the extremities also become cold and insensible, and equally livid with the face. The arterial blood seems as if concentrated in the vessels immediately issuing from the heart; the action of the lungs is impeded; and congestion, determining to the head, is often the inevitable consequence. The power of reaction of the heart, under such difficulties, is in fact suspended; and the torpor of the system previously existing is thus greatly aggravated." (Practical Observations on Insanity, &c. p. 130.) Dr. Hallaran thence regards it as a very uncertain medicine in the treatment of mania. In nymphomania, however, camphor has been found highly beneficial; and it is also an admirable adjunct to opium in that variety of insanity which frequently follows a continued course of intoxication.

The opinion that camphor has the power of allaying the strangury which occasionally follows the use of cantharides was first hazarded by Dr. Grainger in the beginning of the last century, and is still credited by many; but it is erroneous: Dr. Heberden, indeed, has demonstrated, that when freely administered camphor causes strangury. The idea that it diminishes salivation is not better founded.

In prescribing camphor, its precipitation from the alcoholic solution, suspended by mucilage in any bland vehicle, is a good form of administering it: or it may be held in solution in water by means of carbonic acid. It has been also successfully used in the form of a vapour bath by some of the continental physicians. The patient is placed on a chair with an open cane bottom, beneath which a chaffer, covered with a plate of iron, is placed; the whole apparatus is surrounded with a blanket, which is pinned round the neck of the patient. A dessert-spoonful of camphor in powder is then thrown upon the iron plate; it is instantly volatilized, and involves the body in an atmosphere of camphor vapour. The patient perspires freely; and in three-quarters of an hour afterwards he may be rolled in a blanket and carried to bed. The sweating must be maintained by tepid fluids. In chronic rheumatism this fumigation should be repeated three or four times a day, and continued for some time after the pains have disappeared. The dose of camphor is generally too small; its narcotic influence being seldom obtained from less than half a drachm: we have given it, with advantage, to the extent of four drachms in the day, in low fever. It operates with more energy when administered per anum than when taken into the stomach: the camphor is quickly felt in the breath; an indescribable uneasiness succeeds, then vertigo, with pallidness of countenance, chilliness, and a low intermitting pulse. Opium, brandy, and ammonia are the means of counteracting these effects of camphor.*

[*Asclepias Syriaca*, Silkweed or Milkweed, and *Lycopus*, Bugleweed, are officinal indigenous Narcotics, but they are not much used.]

We consider it unnecessary to enter more particularly into the consideration of the narcotic agents; the *ethers*, *alcohol*, and some vegetable matters, operate by exerting a direct influence on the nervous energy through the medium of the circulation; but this does not affect their practical utility. It only remains to close our remarks on narcotics with a few statements respecting the influence of what may be termed *mental* narcotics. Mental impressions rouse or depress the nervous energy according to circumstances; we consider those impressions narcotic which at first rouse the system, but by repetition at length exhaust it, in the same manner as stimulant material narcotics exhaust, and induce sleep. *Sound* is one of these mental impressions; but it is necessary to explain that it is not the repetition of sound, but of the same sound, which produces the narcotic effect. When sound is varied, the opposite result occurs, the attention is kept awake; and it is a law of the system that the variation of the stimulus renews the excitement in such a manner, that collapse is prevented for a greater length of time than when there is a repetition of the same sound. It is the monotony of sound, therefore, such as the gurgle of rills, or small water-falls, the voice of a dull preacher, the moaning of the breeze, &c. that is followed by soporific effects; and on the same principle, slow and plaintive music has been found practically useful in the treatment of some peculiar cases of insanity. In this case, the slower, longer-continued, and less varied the impressions are, the more powerful is the sedative influence of the music; and something is also produced by the period of the day and the situation in which the listener is placed. The stillness of evening is highly favourable to the employment of music as a soporific agent;

> "——let the sounds of music
> Creep in our ears; soft stillness, and the night
> Become the touches of sweet harmony."

And when sleep is induced, there is much less

* The best work to be consulted on camphor is the Traité de Camphre, by M. Grauffenaur, Strasbourg, 1822

likelihood of its being disturbed than if it occur during the day. *Gentle friction* and *titillation* produce also soothing effects, on the same principle as the monotony of sound; in cases of pain we have seen them prove useful, by transferring the attention from its seat, to the mild and agreeable impressions of the friction; and this acquires power by joining it with monotony of sound. Thus we know that patting an infant on the back, whilst at the same time the nurse hums a monotonous tune, is almost always sure to produce sleep. Were it requisite, many instances of the beneficial effects of mental narcotics might be brought forward; but enough has been said to show the importance of not disregarding them in cases in which they are likely to prove beneficial.

[The passes and other manipulations of the animal magnetizer induce a like effect, as well as a series of singular and anomalous phenomena, the consideration of which would be inappropriate here.]

A. T. Thomson.

[NAUSEA. See Indigestion.

NAUSEANTS. Although the individual agents in the class of Nauseants belong to Emetics, there is philosophy, as the writer has done elsewhere (See his *General Therapeutics and Materia Medica*, i. 91, Philad. 1843), in separating the consideration of those agents when employed simply with the view of inducing nausea from that of emetics. It has been before said (See Emetics) that the state of nausea is one of reduced action, and hence it can be understood, that if sedation, thus induced, be kept up for a sufficient length of time, it may succeed in subduing inflammation, and the morbid exaltation of organic actions, which constitutes ordinary fever. These effects can be accomplished by nauseating remedies properly administered; and hence but little difficulty is experienced by the practitioner in laying down his indications for the use of nauseants, or in carrying these indications into effect by one or other of the numerous nauseants that are contained in the catalogues of the Materia Medica.

In regard to the condition of the functions under the influence of a nauseant, when carried to the extent of inducing marked nausea, there can be no difference of sentiment; but it has been a question, whether if these same agents be given so as to fall short of inducing nausea, or any sensible evidences of their action—in *alterative* doses, in other words—they may not modify the functions in the same manner as full nauseants, but to a less degree. Much may be said in favour of the affirmative view of this subject, but it is one not easy of demonstration. Were we, indeed, to deny the position altogether, it would be difficult to account for the operation of antimonials, or of many other reputed diaphoretics in small doses, which are emetic in larger. All admit, that when the tartrate of antimony and potassa is given so as to produce nausea, it is a decided sedative and diaphoretic,—diaphoretic because sedative. The state of nausea being, as already remarked, one of diminished action, the exalted vital manifestations constituting fever are reduced by it, and diaphoresis, which had been checked by the febrile irritation, is restored. In such case, the antimonial—like every other diaphoretic, perhaps—is an indirect agent only. But if the tartrate be given in doses somewhat smaller than are requisite to induce nausea, it may still be conceived, that an action of sedation may be exerted, although it must be confessed, that we have no sensible evidence of such an effect except the result; and it must be equally confessed, that in our uncertainty we ought scarcely to place the confidence in those agents which is occasionally done by practitioners. Fortunately, however, this very confidence is, at times, followed by negatively beneficial results. It prevents the partisans of the perturbating treatment of fever, by violent and repeated cathartics, from causing as much irritation as they might otherwise do, and gives the patient a little of that quietude and absence from disturbance, which are so important in the management of all febrile cases, and especially of such as are accompanied by erethism in the mucous membrane of the intestines.

In respect to the therapeutical treatment by nauseants, they are clearly proper in all internal inflammations, as well as in every kind of active hemorrhage; whenever, indeed, it is desirable to diminish the force and velocity of the circulatory movements. In such cases they are amongst our most valuable therapeutical means, and if the system can be kept, for any length of time, sufficiently under their influence, the local hyperæmia will often yield after it has resisted other agencies.

In constipation, a union of nauseants with cathartics becomes occasionally advisable, and, at times, effectual, after cathartics alone have been employed without success. If the constipation be dependent upon any irritated condition of the exhalants of the canal, the use of debilitants, such as these now under consideration, reduces the erethism, and facilitates the operation of the cathartic. Whenever, too, it is desired to break in upon a chain of disordered actions, and especially in the neuroses, nauseants may be beneficially administered; but in these cases the revulsion, induced by a nauseating emetic, is generally preferred, in consequence of the more powerful impression made by it on the nervous system.

The practitioner has to reflect whether the state of the organic actions be such as to require the debilitant agency, which nauseants exert, and it is not generally difficult to arrive at a correct conclusion. Perhaps, in all cases, the tartrate of antimony and potassa is capable of fulfilling the desires of the physician, but occasionally other articles are selected — ipecacuanha, by some; squills, especially when the affection is seated in the air-passages, by others; but there is no sufficient reason for the belief that other nauseants are preferable to the tartrate,—and, moreover, being devoid of any stimulating property, it can be administered in many cases in which the exciting emetics would obviously be improper.

With similar objects nauseants are had recourse to in surgical practice. Whenever it is desirable to depress the energies of the system, and to induce relaxation of constricted parts, they are advantageously employed. In strangulated hernia, tobacco smoke or tobacco infusion is thrown into the rectum; but the use of tobacco, even in these forms, is not devoid of danger, and perhaps there

is no relaxant effect caused by it which might not be equally produced by the nauseants above mentioned.

When a luxated limb has to be reduced, the force of contraction of the muscles is diminished during the existence of nausea; and if the surgeon, at the time, employs his *manœuvres* dexterously, he may succeed in effecting the reduction.

Lastly. — To the obstetric practitioner, nauseants are no less useful. When the tartrate of antimony and potassa is given so as to impress the system, it removes rigidity of the os uteri; and in violent or irritable labour the inordinate activity of the uterus is allayed by it, whilst the dilatation of the mouth of the organ is facilitated. In puerperal convulsions, obstructed and inflamed mammæ, and in puerperal mania, their employment has been found advantageous; but it is needless to point out every affection in which they may be prescribed with benefit. By bearing in mind the sedative influence which they are capable of exerting, the practitioner can meet with little difficulty in deciding upon the cases in which their exhibition may be noxious or salutary.

ROBLEY DUNGLISON.]

NEPHRALGIA AND NEPHRITIS. — In several of the morbid affections incidental to the kidneys the symptoms are, as we have endeavoured to show in a former article, (KIDNEYS, DISEASES OF,) so nearly alike as to render it very difficult, if not impossible, to distinguish between them during the life of the patient. Nor is accuracy of diagnosis of much importance in some of these affections, the treatment of which experience has taught us is to be conducted not only on the same principle, but in the same manner as regards its minutest details. But to distinguish clearly between nephritis—inflammation of the substance of the kidneys, or of their capsules and surrounding cellular membrane—and nephralgia—pain of the kidneys from calculus — is of great moment, since the remedies most proper for the one would be unavailing or injurious in the other. In nephritis, especially in that species where the capsule is the seat of inflammation, bloodletting is absolutely necessary; but in many cases of nephralgia, bleeding would do harm. Again, opiates are not proper in nephritis, at least not till the inflammation has been decidedly arrested; while in nephralgia they are often eminently serviceable from the commencement of the attack.

In order to form this correct diagnosis, let us take the definition of nephritis as we find it laid down by Dr. Cullen in his Nosology, and let us observe wherein it is applicable to both the diseases in question, and wherein it applies to nephritis only. The definition is as follows: "Pyrexia; pain in the region of the kidney, often following the course of the ureter; frequent desire to pass urine, which is either limpid and colourless, or very red; vomiting, numbness of the leg; retraction or pain of the testicle of the same side."

Now, what we are most carefully to attend to in the above definition, is *the pyrexia*—the fever, and the description of fever. All the other symptoms are common to both nephritis and nephralgia; indeed, the *pain* in the latter affection may be much more intense than in inflammation of the substance of the kidney, and quite as severe as when its capsule is inflamed, but the pulse is little, if at all, affected, and the other signs of inflammatory fever are absent. But if, with the symptoms of the local affection, we find a frequent hard pulse, a loaded tongue, great heat, and dryness of skin, we may at once pronounce the disease to be nephritis.

While we are careful not to mistake these two affections of the kidney for each other, we must also be upon our guard lest we confound either of them with certain other diseases which are accompanied with symptoms very similar. They have, for instance, been mistaken for lumbago; but here again the definition will assist us. In lumbago there is seldom much fever; there is no nausea; the urine does not present the appearances which indicate affection of the kidney; in lumbago the pain varies; it is most felt upon resuming the erect posture after the body has been bent, whereas in nephritic affection it remains much the same in every position.

Nephralgia and nephritis may both be mistaken for inflammation of the psoæ muscles; but in inflammation of those muscles there is neither nausea nor retraction of testicle, nor alteration in the flow or quality of the urine; the pain is increased considerably on rotating the thigh, and, if the disease has long subsisted, there is great emaciation.

Nephralgia may be mistaken for enteritis; for, as Dr. Pemberton has remarked, enteritis sometimes commences with such severe pain across the loins as absorbs all other sense of uneasiness; and in nephralgia there is often a sympathetic pain in the abdomen, midway between the os ilium and navel, which is extremely acute, and much increased upon the slightest pressure. We have met with instances where this sympathetic pain has been even greater than that arising from inflammation, and where the lightest possible covering could not be borne without distress to the patient. Now, in a case of nephralgia, should the medical practitioner fall into the error of pronouncing the disease to be enteritis, and proceed to treat it accordingly, that error, though it would prove a sufficiently inconvenient one to the sick person, and would reflect discredit upon himself, might not prove a fatal one; but how lamentable, as well as disgraceful, would be the consequence of his mistaking enteritis for mere nephralgia! The practitioner should, in every case, be cautious; he should put together all the symptoms, and carefully weigh their aggregate force, before he ventures to pronounce a decided opinion upon the disease. In severe nephralgia he will particularly remark, that though the pain and tenderness upon pressure, in the situation above mentioned, are requisite, yet neither the pulse, nor the temperature of the skin, nor the expression of countenance, are those of a person labouring under inflammation of the peritoneal covering of the intestines; neither is there the same obstinate constipation, the bowels being generally acted upon by emollient enemata.

Another disease, with which a nephritic attack is liable to be confounded, is colic. The mistake is not, perhaps, as Galen observes, of much moment, since, at the commencement, the mode of treatment in both is pretty much the same. Still,

however, it is proper to distinguish between them. In colic, the pain is more paroxysmal; there are intervals of absolute ease; there are gripings and distension of the lower bowels; and the pain, instead of being in the loins, and following the course of the ureter, is chiefly about the navel; there is no numbness of the thigh or leg, or retraction or soreness of the testicle.

It is further to be remarked that a pain in the region of the kidney, extending through the ureter, and accompanied by almost all the other symptoms of a nephritic attack, will sometimes take place from hysteria, so that, to adopt the language of Sydenham, it is extremely difficult to distinguish whether these symptoms arise from calculus, or from some hysterical affection, unless perhaps some misfortune having greatly distressed the patient a short time before the disease came on, or the discharge of green matter by vomiting, should show that the symptoms are rather to be ascribed to hysterical than to calculous affection. It is, indeed, very difficult to arrive at any certainty here; we should, however, carefully investigate all the symptoms; we should inquire whether the patient has previously been subject to hysteria; we should endeavour to ascertain whether the uterus and its appendages are in a healthy state, whether menstruation be performed with regularity, and whether the secretion be natural, and we should particularly observe the state of the urine.

Nephritis, as has been already observed, is no otherwise to be distinguished from nephralgia than by the symptoms of inflammatory fever which attend it; and these symptoms will be more or less marked, according as the disease occupies the capsule of the kidney and its surrounding cellular membrane, or its substance. In the former case, there will be pain — burning, pungent, and great — in the region of the kidney; there will be inflammatory fever strongly marked. In the latter case, the pain will be less urgent, — it will be more of a dull, heavy pain, and the accompanying fever will be more moderate; but still the pulse will be more frequent and harder than in a fit of the gravel simply; the tongue will be furred, the skin hotter than natural; the symptoms will be those of subacute inflammation. The former has occasionally been observed as an idiopathic disease; the latter occurs only in consequence of calculi retained in the kidneys, or external injury, or perhaps hydatids. The difference of intensity in the symptoms, depending upon the seat of the inflammation, seems, until of late years, to have been overlooked by authors of the highest reputation.* The late distinguished Professor Gregory, when, in his admirable lectures, he spoke of idiopathic and symptomatic nephritis, appeared to regard both as affecting the substance of the kidneys; he did not, as far as we recollect, throw out any hint of their capsules and surrounding cellular membrane being the chief or the only seat of idiopathic nephritis.

We have thus endeavoured to point out how nephritis and nephralgia may be distinguished with tolerable certainty from each other, as well as from certain affections of the surrounding parts; but no small degree of obscurity yet remains: it is extremely difficult to discriminate between an affection of the kidney itself, and disease of other parts of the urinary system; for one extremity of that system so readily and so rapidly sympathises with the other, that the same set of symptoms will often occur wherever the disease in the urinary organs may be located. Thus, a stone in the bladder may give rise to all the sensations of disease in the kidney, and a calculus in the latter may produce every feeling of disease in the bladder. We would, therefore, impress upon the mind of the young practitioner the importance of extreme caution in pronouncing upon disease of the urinary system.

We now proceed to offer a few observations upon some of the symptoms which belong equally to nephritis and nephralgia; and first, as to the pain generally following the course of the ureter. This pain in the region of the kidney is a very common but not an essential symptom; it sometimes is entirely wanting, and sometimes is so obtuse that it is not noticed, until vomiting comes on and attracts the physician's attention, and induces him to make minute inquiries: in other instances it is extremely severe, yet, upon examination after death, the kidney of the suffering side has been found free from all trace of disease, while the opposite one has been completely disorganized.

Another symptom which is also usually, but not invariably present, is dull pain, or numbness of the thigh and leg. Attention to the distribution of nerves will enable us to comprehend this affection of the lower extremity, as also that of the testicle, which frequently occurs. We have only to bear in mind that the semi-lunar ganglion of either side sends off branches which unite together, and with branches of the par vagum, to form the solar plexus, from which may be traced nerves going to various parts, and among the rest to the kidneys and the testes. The renal and the spermatic plexuses are derived from the same source, i. e., from the great solar plexus formed by the sympathetic and par vagum; and if we trace the sympathetic into the pelvis, we shall find that it is connected with the nerves which pass to the leg. To account for the derangement of stomach, the eructation, nausea, and vomiting which attend nephritic affection, we have also to recollect what nerves concur to form the renal plexus, and what nerve it is that supplies the stomach.

The frequent desire to pass urine may well be explained upon the principle of irritation. The secretion is either scanty, very high-coloured, and mixed with blood, or it is limpid and nearly colourless. The former appearances we may expect to find when calculus is present, or when the affection has been induced by violent horse exercise or by external injury; the latter are more likely to take place in acute idiopathic inflammation. Sometimes there is total suppression, a symptom, as we have shown under URINE, SUPPRESSION OF, to be of very formidable character; it is not, however, necessarily a fatal symptom where the kidneys are primarily affected: we have known it to subsist for above a week in a case of nephritis from calculi, and where the in-

* Boerhaave, for example, says, "*Ipsos renes* verâ inflammatione occupari scimus ex dolore ardente, pungente, magno, inflammatorio, loci ubi renes sunt; ex febre acuta, continua concomitante."

flammation terminated in abscess, as was proved by purulent matter in considerable quantity being passed with the urine. In this case the head was little affected, and though there was great pain, with most distressing nausea and retching, the pulse was hardly more influenced than in an attack of gall-stone.

[A recent pathological writer, M. Rayer, (*Traité des Maladies des Reins*, Paris, 1839,) who considers some form of nephritis an exceedingly common disease, distinguishes four varieties according to the parts of the kidney that are involved; — 1. *nephritis*, where the gland itself is inflamed; 2. *pyelitis*, where the pelvis and calices are the parts inflamed; 3. *perinephritis*, where the inflammation is in the investing membrane; and 4. *pyelonephritis*, when both the pelvis and the granular structure are involved.]

Acute idiopathic inflammation of the kidney may be produced probably by any of the general causes of inflammation, but especially by exposure to cold, or violent exercise on horseback. Cases of this description are, however, of very rare occurrence. It does not appear that Dr. Baillie ever met with an instance of inflammation of the capsule of the kidney; and the late Professor Gregory used to state in his lectures, that he never saw a case of pure idiopathic nephritis. Symptomatic nephritis, i. e. inflammation of the substance of the kidney, or nephralgia with inflammatory symptoms, is, however, far from uncommon. Its most usual exciting cause is calculous matter blocking up the tubuli uriniferi, or calculi formed in the pelvis of the kidney and obstructing that cavity, or the canal of the ureter. But it may also arise from other causes, as from a blow, or a bruise or strain, from severe exercise, long confinement in a recumbent posture, plethora, acrid diuretics, excess in the use of spirituous liquors, poisons.*

There is a great connection between nephritic affection and gout. In some individuals the two diseases make their assault simultaneously; in others they alternate: we find some members of a family affected with gravel, and others with gout; and families have been known where all the men had gout, and all the women gravel. It is to be observed that the former disease is more common in men, owing, probably, to their freer mode of living. The descendants of gouty parents seem to be hereditarily disposed to both diseases. In a family with whose history the writer of the present article is intimately acquainted, the paternal great-grandfather and his wife died martyrs to gout, the one at the age of forty-three, the other at forty-five: their elder son had occasional smart fits of gout till the age of sixty-five, when they left him to return no more till his death, which happened in his eighty-eighth year; his elder son, a man of very temperate habits, never had gout, but died at sixty-six of severe disease of the urinary organs: the two sons of the latter, who have both reached the middle of life, have hitherto been entirely exempt from gout, but both exhibit a disposition to nephritic affection.

Inflammation of the kidney may terminate in any of the ways of other inflammations: it may terminate in resolution; or a profuse sweat, or a copious flow of urine, high-coloured, thick and mixed with mucus, may carry off the disease; or the same may be effected by a considerable discharge of blood from the hemorrhoidal veins. The relief afforded by such a discharge has been noticed by the great father of medicine;† and his commentator Galen observes that the untimely checking of habitual hemorrhoids has given rise to nephritic affection.

To the intimate connection which subsists between nephritic affection and gout, allusion has been already made. That the sudden suppression of the latter may occasion ischuria renalis, or renal inflammation, is well known; and a decided attack of gout supervening upon nephritis may effectually relieve the kidneys. If, however, the symptoms be protracted beyond the seventh day, suppuration will in all probability ensue, and will be declared by its usual symptoms, as frequent irregular rigors, dull, heavy, throbbing pain, &c. The entire kidney may be thus consumed, and in its place may be found a collection of pus: cases of this kind are not uncommon. Again, the inflammation may terminate in an indurated condition of the kidney: its natural structure may be partially or totally lost; it may degenerate into what, by the most skilful morbid anatomists, has been considered a truly scirrhous state, and then permanent lameness may be the consequence. Lastly, nephritis may run into gangrene, as is well attested by Boerhaave and other systematic writers. Such a termination is doubtless extremely rare at the present day; but an example of it has been given by Dr. Turner in the fourth volume of the Transactions of the College of Physicians in London.

We now approach the subject of *treatment;* and, first, of that of pure idiopathic nephritis, which may be disposed of in very few words. The inflammation must of course be met by the same prompt and energetic measures which we are accustomed to employ for the purpose of arresting acute inflammation of other parts. Bloodletting, both general and topical, is a remedy of the first importance, and it should be employed early, and with freedom, lest suppuration or gangrene ensue. The whole of what is understood by the term *antiphlogistic regimen* should be strictly enforced. The warm bath and fomentations should not be neglected. Mild diluents may prove useful; and perhaps some of the class of diuretic medicines, as the infusion of digitalis; but all diuretics which possess a stimulant property should certainly be avoided. It is of importance to unload the bowels, and afterwards to maintain their action; but saline purgatives, being disposed to pass off by the kidneys, are improper in this disease. The mildest laxatives alone should, in the first instance, be tried; such as a draught with one or two drachms of oil of almonds, or castor oil with manna, repeated every third or fourth hour; should this fail, castor oil in a larger dose may be exhibited; or the compound infusion of senna with manna; or, in the event of the bowels continuing obstinately cos-

* A peculiar irritation, it is said, has been produced in the kidneys by arsenic, especially by the fumes of that mineral.

† Τοῖσι νεφριτικοῖσι αἱμόῤῥοΐδες ἐπιγενόμεναι ἀγαθόν. Sect. 6, aph. 11.

tive, recourse may be had to stronger purgatives, as jalap with calomel. It is, however, to be recollected that, owing to the nausea which is so constant an attendant of nephritis, it will frequently be found impossible to administer either oily or other laxatives by the mouth. Emollient glysters, or glysters of warm water only, should then be thrown up, and we should desist from all attempts to administer medicine in another mode until the stomach become more settled. Emollient glysters are useful both as fomentations and evacuants: by this employment we may unload the colon, to unload which is of considerable importance. Blisters have been recommended by some authors of credit, but we should protest against their being resorted to.

If, after the lapse of six or eight hours, the pain and heat in the region of the kidney be not relieved, and the hardness and frequency of the pulse remain, nearly the same quantity of blood should again be drawn from the arm and from the loins by cupping or the application of leeches; and should the inflammatory symptoms still continue, a repetition of the same means may be necessary. We must be guided here, as in acute inflammation of other organs, not by the quantity of blood drawn, but by the impression produced upon the system by its abstraction.

Such is an outline of the plan of treatment to be adopted in pure nephritis. If it terminate in resolution, or by any critical discharge, little will be left for the physician to do afterwards; if, in spite of the most active measures, it run on to suppuration, the treatment must be such as will be hereafter pointed out. If the sudden cessation of pain, hiccup, clammy perspiration, feeble intermitting pulse, great prostration of strength, ischuria, or dark, flaky, offensive urine, indicate that gangrene has taken place, the case is indeed all but desperate; strong cordials and stimulants must then be resorted to: recovery *may* follow, but a fortunate result is a sort of miracle.

In symptomatic nephritis, inflammation of the substance of the gland, from calculi or any other of the causes above enumerated, our treatment must be conducted upon the same principles as in the foregoing species, but, as the inflammatory symptoms are less marked, the same freedom in the use of the lancet will hardly be required at the onset, and seldom will there be need to repeat venesection. Local depletion seems more applicable in this grade of the disease. When, however, the pain has come on very suddenly, and is extremely acute, blood should be taken to the amount of ten or twelve ounces from the arm; recourse should be had to the warm bath or hip-bath; and, if circumstances seem to demand it, local depletion may be subsequently employed. When the disease has been induced by a strain, or blow, or bruise, or by violent exercise, &c., a second bleeding may sometimes be necessary, and a strict adherence to the antiphlogistic regimen will be expedient; but when it appears clearly to arise from calculus, we may generally, after one moderate bleeding, and opening the bowels by mild laxatives, have recourse to opium, in the dose of a grain every second or third hour, according to the urgency of the pain. Opium is in fact the grand remedy in calculous nephritis; it moderates the pain and checks the vomiting, relaxes the spasm, and promotes the descent of the stone into the bladder. If the affection be simply nephralgia, bloodletting will seldom be required; yet if the pain be extremely acute and long-continued, it may be expedient, as a measure of precaution, to take away blood in moderate quantity by cupping from the loins, or even from the arm, since, though none of the essential symptoms of inflammatory action may be actually present, or at least none which we can detect, we can never be sure that inflammation will not supervene, or that it is not already obscurely existing; and we must constantly bear in mind that a degree of renal inflammation, not to be discovered during life, is sufficient to produce abscess of the kidney or a total destruction of the gland.

In nephralgia, having first unloaded the bowels by a brisk cathartic, or, if the stomach be in a very irritable state, by a purgative glyster, opium, in a full dose, and repeated at short intervals, is of great service, and glysters of starch, with laudanum, may also be employed. Every mean should be resorted to to favour the descent of the stone into the bladder, and to afford the patient a chance of its being passed by the urethra. To increase the flow of urine, mild diluent liquids should be freely taken; with the view of relaxing the parts, fomentations should be diligently used; and, as soon as possible, the patient should be placed in a warm bath, and, while in the bath, he should endeavour to pass urine; the attempt will often succeed under these circumstances, though it has failed before. The means to be adopted, by way of obviating a return of nephralgia, are those which have been found most efficacious where the *lithic diathesis* is known to prevail. Alteratives and aperients should be exhibited so as to promote the proper actions of the organs concerned in the digestive process. Five grains of the compound calomel pill may be given every other night, or five or six grains of hydrarg. cum cretâ, with an equal quantity of rhubarb and a grain of ipecacuan. In robust habits we may prescribe from two to three grains of calomel, combined with four grains of James's powder and three grains of compound extract of colocynth and of extract of hyoscyamus, to be taken at bed-time twice a week, and to be followed up the next morning by a Seidlitz powder, or by three drachms of Epsom salts, a scruple of carbonate of magnesia, and six of powdered ginger, in half a pint of tepid water. A tea-spoonful of magnesia in soda-water, or twenty minims of the liquor potassæ in linseed-tea or barley-water may be given twice a day, or more frequently, according to the urgency of the symptoms. But one of the most valuable medicines we possess is the diosma crenata; the infusion of its leaves has often given decided relief to nephritic patients when various other remedies have totally failed.* We have repeatedly wit-

* The diosma crenata has been long known to British botanists as a plant highly esteemed among the Caffres as a remedy in nephritic complaints. It is noticed, upon the authority of Sherard, in Ray's Historia Plantarum, tom. iii. lib. 30, p. 91, under the title of Spiræa Africana, or Buchu of the Hottentots, and is there stated to constitute the principal ingredient of a certain powder in use amongst them—"primarium ingrediens pulveris Cyprii Hottentottorum." It has within the last few years been favourably introduced to the notice of the profession in this country.

nessed its soothing effects, and it appears to possess a tonic property—it seems to give tone to the stomach. It is a valuable addition to the Materia Medica, and merits a more extensive trial and more careful observation as to its effects than it has hitherto received.

[It is recommended by Dr. Joy (Tweedie's *Library of Medicine*, 2d Amer. edit. vol. iii. Philad. 1842) "in chronic diseases of the prostate, bladder and kidneys, gravel, &c.,"—as if the pathological condition to be rectified, were in all these cases identical! *New Remedies*, 4th edit. p. 239, Philad. 1843.]

In cases where there is great weakness of the loins, accompanied perhaps by dull heavy pain, mechanical support will frequently afford great relief. For this purpose a tight bandage may be applied, or a plaster, such as the emplastrum cumini, emplast. ammoniaci, or emplast. oxyd. ferri rubri.*

When an abscess forms in the kidney, it may open in the loins, or it may burst into the pelvis of the organ, and be discharged with the urine. In the former event the aid of the surgeon will be required. If the abscess be of a scrofulous nature, the termination of the case will in all probability be unfortunate. The surgeon will have to deal with sinuses, which will prove very troublesome, yet by means of setons they may sometimes be healed. If the ureters be plugged up with scrofulous matter, there is no chance of a cure, but temporary relief may be afforded; the sinuses opening at an inconvenient part may be healed by seton, and an outlet be made in a more favourable situation. In the latter case, should the abscess be the result of common inflammation, the patient has a good chance of recovery. Balsamics, as the Chian turpentine, may be employed, and the uva ursi may be of service. Should it be, as it commonly is, of a scrofulous character, the prognosis must be unfavourable. In such cases generally the infundibula, pelvis, and ureter partake of the disease; more or less symptomatic fever attends, and the patient is worn out by the irritation and drain. Such, however, is not always the case; patients do occasionally recover against hope, whether by the resources of nature alone, or the aid of medicine, may admit of great doubt; but certainly it is the bounden duty of the medical attendant to bring into the field those remedies which have the reputation of being useful in scrofulous disease — sarsaparilla, cinchona, liquor potassæ, conium, cum multis aliis.

The termination in gangrene is happily of rare occurrence; and when such is the termination, nothing is to be expected from medicine.

We would, in conclusion, impress forcibly upon the minds of persons who have once suffered under an attack of nephritis or nephralgia, the consideration that they are extremely liable to a recurrence of the complaint, and the importance therefore of caution as to diet, exercise, &c. Their diet should be plain and of easy digestion, and repletion should be studiously avoided; they should be sparing in the use of strong liquors, and should especially abstain from acescent wines; they should take regular and moderate exercise; they should not acquire the habit of spending many hours in bed, nor should they make use of a feather-bed; they should avoid exposure to cold and damp, particularly the getting wet in the feet.

H. W. Carter.

* Of these the best perhaps is the emplast. oxydi ferri rubri, on account of its stiffness and adhesive quality, not from any effect which we can suppose the iron to communicate.

NEURALGIA.—The term neuralgia, derived from νεῦρον, a nerve, and ἄλγος, pain, signifies pain in a nerve. The pain is in some cases felt in the cord of a nerve, and follows its track; in other cases the pain is felt in the ultimate twigs into which the nerves split, so that a space, or spot, or organ, and not the track of any particular nerve, aches or is acutely sensible. When it evidently takes the course of a nerve, the case is clear, whatever be the character of the pain; but when it affects an organ, a space, or a spot, we pronounce the disease to be neuralgia from the character of the pain and the absence of such other circumstances as would be sufficient to occasion it.

In the most exquisite cases the pain is excruciating, sharp, sudden, stabbing, or plunging, as patients frequently express themselves; more violent at one moment than another, and sometimes greatly mitigated or absent for a longer or shorter period; induced instantly, like an electric shock, by motion or pressure, even by brushing the point of the finger along the affected part, or it being shaken or blown upon by cold air. Firm pressure is frequently borne, and gives ease. If a secreting organ is in the neighbourhood, it is excited. For example, when some nerves of the face are affected, a paroxysm of pain may be induced by masticating, swallowing, blowing the nose, or even by speaking; and a flow of tears, nasal mucus, or saliva, is frequently observed. If there are small muscles in the neighbourhood, they experience twitchings; and, in the severest cases, large and distant muscles may be convulsed. From these circumstances some have called the disease neuralgia *spasmodica*, but, we think, most improperly, because they are only incidental, and the severest neuralgia may occur without them. The pain may be dreadful and occasion delirium.

Such an affection was formerly called *tic douloureux*, painful tic; the latter word signifying a sudden catching or convulsive motion, such as is noticed in the face or other parts of some persons, and is as it were a local chorea, and such as is noticed in some horses that convulsively bite the manger. Persons with such catchings experience no pain. But when twitchings occur in neuralgia, they are attended by pain, and therefore to their name—tic—in this disease, the epithet douloureux was added. As the disease was first noticed and distinguished in the face, where there is an abundance of small muscles and consequently twitchings usually attend it, the twitchings attracted as much attention as the pain, and the disease obtained its designation from both symptoms. Sometimes, between the shooting pains, there is constant aching; and sometimes the part feels painfully benumbed. We have known the neighbouring parts, which were not in pain, benumbed.

The attacks may last days, weeks, or months; and may recur after intervals of days, weeks, months, or years. They may occur chiefly after

exciting causes, or without any obvious reason. They generally occur without warning, but have been preceded by peculiar sensations and some kind of indisposition. The disease may be suspended or may cease, by nature or through art, or may end in apoplexy, insanity, emaciation, and death.

It most frequently attacks the ramifications of the fifth pair, and the first and second branches of the nerve suffer oftener than the third. We notice it therefore particularly over the orbit, under the orbit, in the cheek where the pes anserinus is spread, in the mouth, and along the lower jaw, and in the lower teeth. Some doubt that it is ever felt in the portio dura; others declare they have known it in that nerve. [It is proper to remark, that after the portio dura has passed through the parotid gland, it is associated with a twig of the fifth pair.] An hospital patient of ours complained of it not only in the cheek, but in the course of the portio dura from the stylo-mastoid foramen. We do not see why the disease should be confined to nerves of sensation. Two, or even all the three, branches, are sometimes affected, and the pain may extend even to the other side of the face. We have known it extend down the neck to the shoulder, and along the inside of the arm to the ends of all the fingers and the thumb. Various nerves of the legs, arms, fingers or toes, are occasionally the seat of the disease; and an intercostal, a lumbar, and even the spermatic nerve, has been attacked. The pain may be confined to one nerve, or to it and its branches, may extend to other nerves in the neighbourhood or at a distance, or it may affect nerves distant from each other, simultaneously or successively, and change its seat backwards and forwards. The pain does not always shoot in the course of the nerve, but frequently in the opposite direction. It may not shoot from a nerve through all the twigs, but only through some.

Neuralgia of this character was perhaps first distinctly described in 1756 by André, the French surgeon of Versailles, in his work upon the diseases of the urethra. Dr. James Fothergill, in the fifth volume of the Medical Observations and Inquiries, published in 1776, described it as occurring in the face, and without being aware that André had anticipated him—and no wonder, when we consider the singular mode in which André promulgated his facts—and he tells us that he never saw more than fourteen instances of it. We have not seen so many. He observed it oftener in women; but this great frequency is not a general fact. He never noticed it in persons much under forty years of age, and this observation, we believe, is confirmed. It is rare in children, yet continental writers record cases of it in subjects but seven and nine years old.

Pain of exactly this character, and not to be accounted for by inflammation or organic disease of the part, now and then attacks organs or spots, and not the track of any nerve. The breast, for example, the heart, the testis, may so suffer; and once we witnessed it apparently in the kidney. The character of the pain, and the absence in the part of the ordinary causes of pain, justify us in regarding it in these cases as neuralgia.

In other cases it is not the character of the pain, but the evident situation of it in one or more nerves, that proves it to be neuralgia. Pain is frequently not stabbing and sudden, not of the description above given, but equally deserving to be called neuralgia, because affecting the course of a nerve. It may be acute, though not electric nor excited by the slightest friction; it may be a constant aching. When a nerve is inflamed, there is great pain. When a portion of a nerve has been seen of an uniform dark red colour after death; when a portion has been found diseased and enveloped in gangrenous cellular tissue; or about double its natural size, of a violet red colour, and strewed with ecchymoses of the size of pin's heads; or a serous, bloody, or purulent effusion has been discovered among its fibres; or nerves have been found hypertrophied and connected with fungous ulcers; when a nerve has been bruised, lacerated, or half divided;—pain of greater or less intensity had been felt in the nerve or the parts upon which it is distributed. (See Abercrombie's Researches on the Diseases of the Brain, &c.) Cotugno, Cirillo, Chaussier, Bichat, &c. have seen similar appearances after neuralgia. In some cases of disease of the brain or spinal marrow, even where paralysis is produced, pain is felt at a distance: the paralysed parts sometimes ache severely in hemiplegia. In epilepsy and hysteria, pain is sometimes felt in the course of nerves. A portion of the pain in structural disease of all organs may occasionally occur in the branches and twigs of the nerves irritated by it. Nerves also frequently suffer pain from rheumatism. There is decidedly a rheumatic neuralgia. The exquisite neuralgia, described as tic douloureux, may arise from those vicissitudes of temperature that occasion rheumatism, and may be rheumatic. But pain, not of that description, though perhaps very acute, perhaps dull and aching as is usual in rheumatism, is every day witnessed in the situation of nerves, in persons who have rheumatism in those situations, and who have been exposed to cold, or perhaps cold and wet; and it yields as readily to the treatment of rheumatism as the ordinary rheumatism of other parts. The neurilema, which is a fibrous membrane, is probably still more affected than the nerve, since rheumatism is chiefly a disease of the fibrous membranes. In rheumatic neuralgia we observe all the varieties of suffering occasioned in other parts by rheumatism: sometimes acute pain, with tenderness, heat, and even throbbing, and aggravation of the pain by heat; sometimes dull aching only; sometimes pain on motion, pressure, or other modes of mechanical irritation; sometimes remittent, intermittent, or even periodical, pain. The pain is sometimes exquisite and sudden, assuming the character of tic douloureux, which, we may remark, not only when rheumatic, but sometimes when not apparently so, may assume a periodical type. It is the clear situation of the pain in a nerve, and not the character of the pain, when it is not like the pain called tic douloureux, that justifies us in rheumatism to pronounce it neuralgic. The nerves chiefly attacked by rheumatism are the sciatic and the branches of the fifth. It is frequently very inflammatory, so that the surface is tender, hot, swollen and even red. Sometimes no marks of inflammation are discoverable, and warmth and

other stimuli relieve. In the case of the face especially, (one side only of which is usually affected, and perhaps not only the nerves, but some of the surrounding parts,) there is a great tendency to periodical intermission, and the paroxysms usually occur in the evening.

In hysterical females, portions of the surface occasionally become exquisitely tender, [*Dermalgia,*] so that the least pressure with the extremity of the finger, such as would not occasion pain were the peritoneum or viscera inflamed,—even the sudden falling of the bed-clothes upon it,—causes anguish. The surface of the front of the body is most frequently affected, sometimes only of the abdomen, sometimes only of the chest; sometimes portions of the back only suffer, particularly at the spine; and sometimes nearly the whole surface of both the trunk and extremities. As no pain is felt while the part is not compressed, perhaps this condition ought not to be called *neuralgia.* But the absence of heat, swelling, redness, and of all signs of internal no less than of external inflammation, and of structural affection and serious disease, the perfect inutility of all the remedies of inflammation, the power of the remedies of pure nervous affection and neuralgia, prove it to be a morbid sensibility of the nerves of touch, and perhaps make it merit the epithet *neuralgic.* Cases of this description are occasionally mistaken for chronic peritonitis and other inflammatory diseases; and, when the tenderness is felt in the course of the spine, it is too often set down as a mark of disease of the spine or its ligaments, or perhaps the whole case is referred to an affection of this portion of the spinal cord, while the morbid sensibility of the spot is merely one of the number of symptoms. We saw this tenderness in an *hysterical* and neuralgic middle-aged *man* who had been exposed to malaria.

The nature of neuralgic affections may be evident during life, and immediately, or not till after a lapse of time; may become evident after death only; or may never be discovered.

Inflammatory conditions of the nerves and structural changes, as well as mechanical causes of irritation, may be detected during life if the seat of these conditions is within the reach of observation: and symptoms may be induced which clearly point out inflammation or structural change, even should these be beyond our observation. Occasionally, however, the seat and cause of the irritation is not only beyond observation during life, though discoverable afterwards, but no symptoms are produced which indicate them. After exquisite neuralgia, or that kind denominated tic douloureux, the cranial bonds have been found of unusual thickness, so that it was fancied that probably they had in some degree compressed the nerves. There is, however, no proof that the neuralgia was the effect of the growth of the bone. The latter might have been only one of several morbid changes going on in the head, and some of which caused neuralgia. The state of all the nerves should have been accurately ascertained. In insanity and idiotism the bones are sometimes of enormous thickness through the general tendency to disease in the head, and the insanity is not ascribable to it, but the whole is the result of the tendency to disease in the head. Here, too, there is generally no neuralgia. To show that in some cases of neuralgia the cause becomes obvious after a time only, we may state that Dr. Abercrombrie quotes one case of exquisite neuralgia of the face that ceased on the removal of a piece of china which had been there fourteen years, and another of ten years' duration that ceased on the extraction of a tooth. [M. Andral (*Cours de Pathologie Interne*) attended a man who suffered agonizingly from neuralgia, which irradiated from the mental foramen. The disease was induced by syphilitic periostosis, and it disappeared as soon as the system was affected by mercury. Such cases M. Andral terms *false neuralgia.*] Sir Henry Halford mentions the case of a lady who laboured under violent tic douloureux till an apparently sound tooth was extracted, on account of the attacks being frequently preceded by uneasiness in it, and that a large exostosis was found at its root. He relates the case of a nobleman who was liberated from the disease by the exfoliation of a portion of bone from the antrum maxillare. To ascribe neuralgia, however, to these causes, in most cases is very unpathological. In ordinary rheumatism, which is not inflammatory, in that form which is unattended by heat, and in which there is mere aching relieved by warmth and all stimulants, and probably greatly influenced by atmospheric changes, the real condition of the part is unknown. The same is true, not only of this rheumatism when affecting nerves, not only of the corresponding form of rheumatic neuralgia, but of that exquisite neuralgia, when not rheumatic, and when no inflammation nor structural change, nor mechanical cause, can be detected before or after death. Good pathological anatomists declare they have frequently been unable to detect any unhealthy appearance, on careful dissection.

[The evidence, afforded by pathological anatomy, is far from being satisfactory. "It is often," to use the language of a modern writer on the subject, Dr. Jolly, "negative, always equivocal, and never decisive." The affection is, doubtless, owing to organic changes in the part affected, as in the case of the various neuroses, but these changes are as yet inappreciable. By many, deductions have been drawn from a few facts, and, therefore, prematurely. Of this character, perhaps, is the view of Mr. Alnatt, (*Tic Douloureux*, &c., London, 1821,) that irritation of the sympathetic nerve is productive of the local mischief, in nine cases out of ten, in the expanded branches of the fifth, or rather the ganglionic nerves, which accompany them.]

Occasionally the pain may be sympathetic, may depend upon no fault of the nerves or even the nervous centres, but upon disorder of the digestive organs. Even such an origin cannot always, in obscure cases, be presumed; and we confess that, allowing some of the blame to be deserved that is laid upon the digestive organs as causing all kinds of diseases of all parts — a vulgar assumption easily made and saving a world of investigation and accurate reasoning,—we have never seen one case of neuralgia referable to such an *origin.*

Since this is true of the nature and causes of neuralgia, we see how various must be its course

and its termination, and how various the prognosis as well as the mode of treatment required in different cases.

[Small tubercles are occasionally developed in the course of nerves, which give occasion to excruciating neuralgic pains. These *subcutaneous tubercles* are distinguished, during life, by an examination of the part affected, when a small body, of the size of about half a pea, is felt under the integuments. A case of the kind occurring in the thumb of a shoemaker, and probably from a puncture of his awl, which was cured at once, after years of suffering, by excision, is related by Dr. Marshall Hall. (*Edinb. Med. and Surg. Journal*, xi. 466; and *Principles of the Theory and Practice of Medicine*, Amer. edit. by Drs. Bigelow and Holmes.)]

[**Treatment.**]—When inflammation is obvious or presumable, whether rheumatic or not, local bleeding, mercury, colchicum, and the whole antiphlogistic plan, general and local, are appropriate. Should these not succeed soon, anodynes may be added; and the pain may, from an inflammatory commencement, degenerate into pain without inflammation, and demand at last solely the treatment of another form of the disease. When rheumatic and yet not inflammatory, the remedies of this form of rheumatism in other parts are required;—stimulants internal and external, tonics, mercury, and all modes of counter-irritation. Coldness indicates stimulants. Among internal stimulants, besides generous diet, the ammoniated tincture of guaiacum is one of the best. It should be exhibited in such quantity and frequency as to keep the patient comfortably warm. A dose of half a drachm may be sufficient, or six drachms may be required; and a frequency of three times in the twenty-four hours may be sufficient, or the dose may require repetition every two hours; and in general both may be diminished after the remedy has been continued for some time, because it stimulates more and more, and its effect lasts longer. When there is debility, and especially paleness, iron in full quantities operates in the most salutary manner, much more so than quinine.

[The oil of turpentine is highly extolled by some. (Copland, art. *Neuralgic Affections*, in *Dict. of Pract. Med.* ix. 891.)]

The hot bath, of water or vapour, the douche, electricity, blisters, moxas, sinapisms, tartarized antimony, croton oil [the ammoniacal preparations of Gondret and Granville; (see art. COUNTER-IRRITATION)], and acupuncture, [electricity, galvanism, and electro-puncture,] frequently cure, if combined with all other appropriate means. Mercury carried to ptyalism frequently cures, provided the strength will bear it, and the rest of the treatment is well conducted. Even the cold shower-bath or cold douche, if followed by good friction, will cure. A warm temperature of the atmosphere around the patient, and warm clothing, may be indispensable. Anodyne narcotics may be absolutely necessary; and the salts of morphia, stramonium, and belladonna [codeia, and cannabis sativa], carried to a due extent, are by far the best, and sometimes alone will cure.

[Aconitia, veratria, and delphinia have been rubbed on the affected parts (see the writer's *Practice of Medicine*, 2d edit. ii. 314, Philad 1844), and occasionally with marked advantage.]

If the disease is seen to depend upon any organic affection, or upon a mechanical cause, the treatment will be evident. Should no structural or mechanical cause, and no inflammation be discoverable, and should the disease be of the exquisite character, then iron is the best remedy. The use of the subcarbonate of iron was discovered by the late Dr. Hutchison of Southwell. The old dose of half a drachm or a drachm will sometimes succeed. But while exhibiting this remedy in various diseases, we soon discovered that it might be given without any inconvenience in far larger quantities than was imagined.* Even children of eight years old will often take half an ounce or six drachms every four hours. If given in twice its weight of treacle, it rarely constipates. But strict attention should be paid to keep the bowels open during its employment, because, being an insoluble substance and bulky, if it is not regularly discharged, its accumulation may be considerable and produce inconvenience. If doses of a drachm every six hours fail, it should not be relinquished till those large quantities also have failed. Although it is the best medicine at present known under these circumstances, it frequently fails altogether, and still more frequently the disease returns, but perhaps yields again and again to it. In all cases of neuralgia, whether exquisite or not, unaccompanied by inflammation or evident existing cause, iron is the best remedy. Probably other forms would answer as well as the subcarbonate. When iron fails, or affords but imperfect relief, it may be serviceable by improving the general health. Less frequently curative as is this medicine than we had hoped from Dr. Hutchison's statements to find it, the power it was proved by this gentleman to possess over the disease induced us to try it in other nervous affections; and in those which are less frequently connected with an inflammatory or structural condition, its power is very great. The first other disease in which we employed it was paralysis agitans, and the first case was cured. In most other cases we have been disappointed, and probably from organic change of the nervous substance frequently existing. The next disease was chorea, and as that is comparatively seldom dependent upon structural change, we have never once failed in curing it with iron, except when it has been partial or of very long standing—circumstances in which structural change is highly probable. Even in two cases of tetanus out of three, we were successful with it; and in the third, which was fatal, there was too little time to exhibit it.

[The cyanuret of iron has likewise been given, as well as the different metallic tonics, the acetate, sulphate and ammoniuret of copper, the oxide and the cyanuret of zinc, &c., but they have not been found equal to the subcarbonate of iron.]

Quinine, arsenic, belladonna, stramonium, colchicum, are said sometimes to cure this exquisite form. The want of attention to the stomach and bowels, and of the observance of good habits, will aggravate it. Relief is said to be obtained occa-

* See a Paper by the author of this article in the 13th Volume of the Med. Chir. Transactions.

sionally by the application of steam to the part, and sometimes by ice. The application of the strongest narcotics, and all irritants and escharotics, as well as the actual cautery, have occasionally done good.

[In neuralgia of the face more especially, the cause of which has been considered by Sir Charles Bell (*Practical Essays*, Edinb. 1841, p. 101,) to be seated primarily in the intestinal canal, and remotely in the fifth pair of nerves, cathartics, especially croton oil, have been recommended; and this, as well as some other forms of neuralgia, would seem to have been removed by it,—doubtless, through the revulsion it excites on the nerves of the intestines; but it need scarcely be said, that it possesses no specific virtue, as has been imagined by some. In the only case of genuine *tic*, in which it was tried by Dr. Christison (*Dispensatory*, p. 382, Edinb. 1842), no benefit whatever was derived from it.

Of late, it has been proposed by M. Allier (*L'Expérience*, No. xvi. Jan. 20, 1838,) to compress the main artery proceeding to the affected part during the paroxysm. (*New Remedies*, p. 182.)]

When all has failed, the division of the nerve, or the removal of the part, if possible, may be proposed, provided no cause in another part is obvious, and provided the pain is invariably limited to one part. Galen was acquainted with the division of the nerve as a remedy in the disease; but a royal French surgeon-maréchal appears to have been the first who performed the operation. Unfortunately it very rarely cures. One portion of the divided nerve suffers again, or the disease reappears in some other part. Too often there has not been even temporary relief. Yet amputation of the finger or thumb, in which the disease was seated, has succeeded, when the cause of the affection was local. (Med. Chir. Trans., vol. iv. and vol. viii.)

When neuralgia arises from malaria, whether ague has also been produced or not, quinine or arsenic, long continued in the largest and most frequent repeated doses that can be borne without the least inconvenience, are the best remedies; and when it is periodical or intermittent, without evident connection with malaria, they are excellent. But sometimes a full dose of extract of stramonium or belladonna, repeated every hour or two from just before the attack is expected to the termination of every paroxysm, succeeds better.

JOHN ELLIOTSON.

NIGHTMARE. See INCUBUS.

[NIPPLES, SORE. See LACTATION.]

NOLI ME TANGERE, or LUPUS. — The name of *lupus*, which was occasionally used by the older writers on medicine and surgery to signify any ulcer having a destructive tendency, (quasi, voracious as a wolf,) was appropriated to the particular diseases of which we now treat by Sauvages, who considered it a species of cancer, and called it "cancer lupus." The other term by which it is equally well known, is of a still older date; and it is no longer certain in what it originated. Some authors affirm that, the ichorous matter which was formed by the ulcerated parts being supposed to be contagious, this name was given to include an expressive warning to beware the contact of a thing which produced such fearful and unsightly effects. Others state, with greater appearance of probability, that "touch me not" refers to the inutility of using topical remedies in its treatment. However this may be, the terms lupus and noli me tangere are synonymous in British medicine, and have always signified the same thing since they have been used in any definite sense. Biett, indeed, uses the latter term to express malignant ulcers of a cancerous origin; but he will not, we hope, be imitated in this, as this application of it would only serve to add to the confusion which already exists as to the proper comprehension of this disease. We shall revert to this, and to other names which have been used indifferently with it, as we proceed.

There is scarcely any disease of so formidable and obvious a nature about which such uncertain and ill-defined notions prevail. It must have been known to the earliest antiquity. Celsus clearly and forcibly distinguished it from cancer under the name of *cacoethes*; and it is not a little remarkable that the remedies which he recommends are the same which at the present day are most relied on. While other diseases of the integuments have been investigated and described with a minuteness of research which some have considered superfluous, systematic writers have slurred over this with a scanty and superficial notice quite inconsistent with its importance. Some writers pass it over altogether, and others handle it in a manner which gives us as imperfect a notion of the malady almost as if they had left it altogether untouched. This does not surely arise from the rarity of its occurrence, or from the insignificant nature of the affection. A slight acquaintance with the practice of any considerable hospital or dispensary, affords a melancholy proof both of its frequency and its ravages. In Dr. Good's "Study of Medicine" we find the subject despatched in about a page, in which short space he has contrived to insert so much of error, that no person acquainted with the disease could recognise it from his description. Bateman, in his valuable "Synopsis," devotes ten pages to aphthæ; but lupus he is also content to dispose of in one. For the comparative neglect of this subject he excuses himself by stating that he is not aware of any medicine which has been of essential use in its cure. We suspect, however, that one chief reason why the subject has been treated in so insufficient a manner lies in the essential difficulties connected with it. And these are in fact very great. Nature herself does not appear to have assigned in many cases accurate limits to it; at least in the study of these destructive ulcerations, the observers of nature are frequently at a loss to find means for drawing the line of demarcation between true lupus and diseases considered to be of a different pathological nature. In our description of the varieties, or rather species of this malady, we shall observe a somewhat similar plan to that of M. Biett, whose lectures, detailed in the work of MM. Cazenave and Schedel, deliver the best digested history of it to be met with in any language.*

* Abrégé pratique des maladies de la peau, d'après les auteurs les plus estimés, et surtout d'après les documens prises dans la clinique de M. le Docteur Biett, par MM.

Lupus commences by the slow development of a tubercular induration in the tissue of the true skin or mucous membrane; sometimes, perhaps, in the subcutaneous or submucous cellular tissue. According to its situation this tubercle is either single, or else several appear together. While it makes its slow progress towards the surface, the skin takes on a violet colour, which spreads before the advancing tubercle, and seldom yields except to destructive ulceration. After an uncertain time the tubercle makes its appearance on the surface, cracking the cuticle, and forming a coarse laminar scab, from under which exudes a foul ichorous discharge. The crust, which is the surface of the tubercle, is very closely adherent; it spreads and sometimes falls off, exposing an ulceration of a malignant aspect underneath. The latter extends, *pari passu*, with the tubercular crust; but sometimes it spreads beyond the space which this occupies; every time that this falls off, a greater extent of ulceration is visible; and thus it proceeds, unless checked by art, till it commits the most frightful ravages.

This general character of the disease applies to it more particularly when it has its seat on the face, which, in genuine lupus, is the case in nineteen instances out of twenty. But even in this situation it has much variety which a general description cannot include. In describing it more particularly then, we will separately consider it in three forms:—*first*, lupus in which the ulcerative process destroys chiefly in depth; *second*, that in which the destruction and cicatrization do not manifest any open ulceration, and are accompanied by an hypertrophied state of the skin; *third*, lupus which spreads mostly superficially. This division of the subject differs but in the succession from that of M. Biett. It appears the most practical, and therefore the best adapted for closing with the difficulties with which the subject is attended.

1. *Deep or erosive Lupus.*—The first species in our division is that in which the ulcerative process proceeds from the surface towards the centre. We have placed it first because it is the real type of the disease, the undisputed lupus or noli me tangere. The French writers have given to the disease the name of "dartre rougeante" after M. Alibert, who has divided the latter into three species. His *dartre rougeante idiopathique* agrees with this species, which is more especially the lupus of the nose. It very rarely occurs in any other place; but having run its destructive course on that organ, it not unfrequently spreads to the adjacent parts. On the alæ nasi, or at the point, a small tubercle makes its appearance, having its seat more or less deep in the true skin. As it advances, it assumes a livid colour. The skin around it becomes somewhat swollen and painful, and also assumes more or less of a livid or violet hue. After a period, which is various in different cases, a crust forms on the surface of the tubercle, of some thickness, and under this an ulceration extends. The crust falls and is renewed; and at every time that it is detached, it is found that the ulceration has destroyed a deeper layer of the skin. This proceeds very slowly for a long time, the loss of substance taking place nearly insensibly. Although new portions of the incrustation are frequently falling off, and always carry away with them a part of the subjacent tissue, it is not till this process has been going on for a considerable period that the destruction which it has caused is perceived.

In most cases this ulceration is accompanied by a constant discharge, from the nostril of the side affected, of a thin fetid matter. This latter phenomenon may originate in two ways. It may arise from inflammation of the Schneiderian membrane, propagated from the irritation of the tubercle producing the destructive ulceration of the skin. This is a frequent origin of the discharge; and where it is caused in this manner, it is neither so unremitting nor of such a bad quality as in the other case: it partakes here, in fact, more of the character of a common mucous coryza. The other source of the discharge is the actual commencement of the tubercular development in the mucous membrane of the nose itself. It is an indubitable fact that the disease very often commences here. It even sometimes produces much internal destruction without manifesting any morbid alteration in the skin. The history of its progress, when the disease begins in the mucous membrane, is different from that of its cutaneous origin; and we are disposed to think that, not considering this, it has been erroneously stated that it sometimes begins without any tubercular formation. But when we take into account the different structure of the two tissues, the process is quite analogous, whatever apparent difference the first stage of their progress may present. Its beginning in the mucous membrane is after the following manner. After some redness and inflammatory swelling in one of the nostrils, a thin, dark scab forms on the lining membrane, which, if it be torn off, is soon reproduced in the same way as the crust of the external tubercle. The destruction goes on under this thin layer until it corrodes the mucuous membrane and the subjacent tissues just in a way corresponding with that in the tubercles before described. The difference lies not in the character of the disease, but in the nature of the tissues. In the mucous membrane, from its soft, pulpy texture and moist surface,* it is impossible to have the solid induration, denominated a tubercle, which the firm structure of the skin, covered by its dry cuticle, permits, unless by the deposition of a foreign structure, which does not take place in lupus; but there does take place a degree of condensation of its tissue; and in some places where it is most firm in structure, as the hard palate,

A. Cazenave et H. E. Schedel, &c. &c. We wish to acknowledge our obligations to this book. It is written in an unpretending style, but is now justly reckoned, both in this country and Germany, to contain more enlightened information on cutaneous diseases than any other recent work. We cannot but express a wish that Great Britain afforded such an opportunity for the cultivation of this branch of medical study as the Hôpital St Louis at Paris does.

* In other cutaneous diseases a similar relation exists between the mucous membrane and the skin when the former becomes invaded by a disease proper to the latter. Papular eruptions, as lichen, sometimes extend inside the mouth; but here they take on the appearance of aphthous vesicles. In squamous diseases not unfrequently the internal membrane becomes affected; but instead of scales, which, from the nature of the mucous membrane, could not form on it, excoriations take place.

we have known small tubercles to be formed. The crusty exfoliation takes place in both situations; but it is modified as to its density and thickness by the nature of the membrane which secretes it. It is in this form, where the tubercular deposition commences within, that the discharge is sanious and fetid, being in this case the actual secretion from the ulcer; whereas in the former case it is mucus produced, as we have explained, by the irritation propagated to the pituitary membrane.

But whether it be in the cutaneous or mucous tissue that the disease begins, after a short period the progress of it becomes identical. The subjacent cellular tissue and the muscles yield to the ulceration and are destroyed; the cartilages follow in their turn, and very frequently the bones themselves are not protected from its ravages, but partaking in the general destruction, are corroded *pari passu* with the soft parts on the same level. This seems to be the distinguishing property of lupus, and of this particular species more especially. In most other diseases (where there is no actual deposition of morbid structure, as in cancer, &c.) the morbific action affects one tissue in particular, and is more or less confined by its specific irritability to this. But in lupus this does not by any means hold; its ravages have no respect to contrariety of organization: having destroyed the seat of its original development, it continues to eat its way through every tissue which opposes itself in its progress, until its further course is limited either by the destruction of the organ or by artificial means.

To return to the history of its progress. The destruction is generally complete in one of the alæ, or the point of the nose, before it spreads farther on its surface; but sooner or later the disease extends so as to embrace both sides; and wherever it takes up its ground in advancing, it is by the same tubercular deposit with which it began. Sometimes after having destroyed the tip of the nose or one of the alæ, it forms a puckered cicatrix, and seems to be nearly healed up; but it rarely stops in this manner. More generally, after a while, new tubercles become developed in the midst of the cicatrix itself, which ulcerate and destroy with all their original virulence. While the destruction spreads externally in the manner described, in general the internal parts are not exempted from the disease. In the majority of cases some part of the nasal fossa is simultaneously affected with it. The inner surface of the alæ corresponding to the external disease is a common place to find it internally; but the septum narium is the part where its ravages are most generally met with. In such cases the discharge is constant, and becomes an additional subject of disgust to the poor patient. The crusts which collect on the septum and on the turbinated bones nearly block up the passage of the nostrils. Sometimes, indeed, union takes place by adhesive inflammation between the alæ and septum, which has to be divided by the knife and cauterized. Where the disease is not checked by the appliances of art, nature seldom interferes to make its ravages but partial. The soft parts of the nose being destroyed by a gradual external progress, and the internal disease having broken up the septum, the entire organ is thus carried away, and in its stead remains but a square aperture partially divided by a partition, a hideous memorial of its devastating course. The bones sometimes limit its course after it has destroyed all the soft parts; but if it be not arrested before it has gone so far as this, these are also involved. It is at least common for the ossa nasi to be affected; and cases are met with where the destruction invades the superior maxillary bones: usually, however, when the ossa nasi fall, and the septum has been destroyed, it pursues its course no further among the bones.

This is the general account of its ravages, and it seldom stops, unless checked by art, till it fulfils it. Some variety will of course be met with in its course and in its terminations. Instances will be met with where it has disappeared after carrying away one of the alæ nasi; others where it went no further than to carry away the point of the nose. These are singular cases, and will be generally found to have been brought about by art. We have lately seen a case, however, where the ala nasi on one side was taken clean away by the disease, which then stopped spontaneously. In other instances it has run a more superficial course from the beginning, and having eaten through some of the layers of the skin, becomes checked. In such a case it sometimes leaves the nose thinned on the sides, and running into a sharp-pointed tip. It is in these cases that the orifices are liable to be closed by the adhesive inflammation of the internal surfaces.

With respect to the stages of the disease, and the time which they take to run their course, they are by no means definite. The tubercles remain indolent for many months, but when they ulcerate, the disease generally makes quicker progress. No corresponding relation exists between the duration of the malady and the destruction which it produces. While in some it remains without effecting any important loss of substance for several years, in others the whole nose is destroyed in a few weeks.

We must again notice the frequency with which lupus occupies the pituitary membrane. Biett describes with exactness the case where it commences internally, and eats its way from within outwards, its arrival at the skin being preceded by a livid colour. The same author states that it sometimes commences in the skin, and having in its course reached the opening of the nares, it traverses their floor; it then descends along the soft palate, and having destroyed it, returns along the palate bone, eating away the roof of the mouth. But no author has, we think, dwelt sufficiently on the disease as running its course entirely within. It has been long known, indeed, that ulcerations of a bad kind occur at the back of the pharynx, destroying it deeply, and carrying away the uvula and soft palate. These too are often called in surgical works by the improper name of "herpetic ulcers," which infers that they partake of the nature of lupus, as this was and is still too often designated by the term "herpes exedens."* But they often occur in other parts of the nasal

* This name was employed before proper limits were given to cutaneous nosology. To continue to use the term herpes or herpetic in the present day in any other than the vesicular disease so called, only tends to confirm error.

eavity, where they are less obvious; and the insidious lateney with which they commit extensive ravages is sometimes very extraordinary. A great part or the whole of the septum narium may be destroyed without its even being discovered by the patient or by his friends. The chief complaint which is observed is a stuffing in the nose and head, which at length proceeds so far as to alter the voice. This is generally attributed to cold or eatarrh. It is always accompanied by a foulness of breath, which might lead to an investigation of its real source; but this is attributed to worms by the patient's friends; for it is to be observed that this internal lupus occurs almost always in children under twelve years of age.

Its insidious character we have seen strongly illustrated in some cases that occurred in dispensary practice, particularly in two observed by the author's friend, Mr. Smyly. A child, about three years of age, was brought to the dispensary by its mother, who asked for some worm medicine to give it. She said that the child's general health was tolerably good, but that she had a habit of picking her nose, and she was certain that worms was her ailment from her foul breath. Her nostrils were examined, and it was found that the septum was quite perforated by a lupoid ulceration, which reached nearly to its anterior extremity, and extended backwards so far that its termination could not be discerned. Mr. Smyly applied a strong solution of nitrate of silver to the edges of the ulceration, and enjoined that the child should return frequently to have it treated with the necessary vigilanee. She did not return, but was met accidentally, some time afterwards, by Mr. Smyly, who examined the ulceration anew, and found it stationary. She did not go back, she said, because there was nothing the matter with her nose. She had been brought to an apothecary, who gave her medicine for worms, and assured her that this was the whole origin of her complaint. The details of the other case are so remarkably similar, that it would be needless to recount them. Superficial examinations in such cases will often betray the medical practitioner into deep error. We were impressed strongly by the above facts with the necessity for circumspection. In another case of this internal lupus, which occurred to the author last summer, in a girl of fourteen years of age, the voice became completely changed into a nasal tone, and a curious convulsive heaving of the respiratory muscles took place during sleep. A constant coryza, with some fetid discharge, led the author to suspect lupus of some part of the nasal fossa, although nothing could be discerned by inspection. It has lately made its appearance at the root of the nose, near the lacrymal sac, on each side, and confirmed the suspicion entertained of the source of the disease. We notice it for the purpose of calling attention to the effect which the disease appeared to have on the breathing during sleep.*

2. *Lupus with Hypertrophy.* — This form agrees with the first in many points, but its progress and its results are different. Like the former, its seat is frequently the nose, but it does not affect in particular the alæ and tip. It often occurs at its upper part, between the eyes, and on the forehead just above it. The angle of the eye and the cheek beneath it are not unfrequent localities. It may, however, occur on any part of the face, and, according to Biett, even affect the whole face. It begins likewise with tubercles, but they are not like the round hard bodies of the former species. They are rather soft, ill-defined rugosities, having a purplish hue, which spreads from them to the surrounding skin until a circumscribed patch of the latter presents this colour. No open ulceration takes place in the tubercle, but if any single one be watched, it will be found gradually to disappear, leaving a slight furrow behind. This takes place partly by desquamation from the surface, but chiefly by an interstitial absorption going on in the body of the tubercle. Whilst this process is going on in one tubercle, others are growing beside it, and in their turn they undergo the same imperceptible destruction and cicatrization. At the same time the whole unhealthy patch of skin becomes swollen, and presents a peculiar indolent aspect and doughy feel. When this tumid state of the skin goes on to a certain extent, the tubercles are no longer prominent, but the depressions left by the cicatrices are more evident. The base of these often exhibits a white, creamy streak, contrasting with the purple colour of the tubercles, which lie generally on each side of the cicatrices. When the disease, then, is of some standing, it presents the appearance of a swollen, circumscribed patch of the skin, of a violet colour, and in this area there are spots of a deeper hue, denoting the surface of the tubercles, and white marks, the cicatrices of tubercles which have disappeared under the slow process before mentioned.

This form, although also a very chronic malady, spreads more quickly than the first; its manner of extending its limits is the following. On the edges of the morbid surface flat tubercles arise, similar to those by which it at first commenced; their destruction is effected by the desquamation before mentioned, while those inside the area, of an older date, are removed by the interstitial cicatrization. By this double process much destructive change takes place in the tissue of the part

* This singular effect certainly depended on the disease of the nostrils, for the lungs were ascertained to be quite sound by a careful stethoscopic examination. The breathing was performed quite naturally during the day, but the moment sleep came on, the respiratory muscles were thrown into a kind of clonic convulsion, which increased with the intensity of the sleep. The writer was called twice to witness it for the purpose of getting further light as to the nature of the disease. Two things struck us as of peculiar physiological interest in considering this spasmodic action of the muscles of respiration. First, its occurring only during sleep, and secondly, its being confined to one side. The following explanation occurrred to us:—The spasm was remotely caused by the want of free perspiration. The purely voluntary muscles withdrew their assistance during sleep; and the instinctive respiratory muscles having then more to do, they were easily thrown, in a weak, irritable child, into spasmodic action. The spasm having for its end, apparently, the perfect freedom of action of the muscles of one side, and this the opposite side to which the obstruction existed in the nasal fossa, we could not help seeing an analogy between this and the cases where, an obstruction existing in one lung, the patient instinctively lies on the diseased side, to leave the muscles of the sound side perfectly unrestrained in the respiratory motion. If this be a true analogy,—and we were persuaded, whilst considering the case, that it was,—the obstructed state of one of the air-passages of the nose produced a sympathetic effect on the lung and the muscles of respiration of one side,—a striking illustration of the sympathetic consent which subsists between the various parts of the respiratory apparatus.

affected, for although there is no open ulceration, and there seems to be an actual hypertrophy of the skin, the latter has lost all the characters of healthy skin. It is not painful even to slight pressure. It evidently extends to the subcutaneous cellular tissue; indeed it would appear from feeling it, that most of the deposit which constitutes the swelling exists in the latter. This enlargement presents to the touch something of the feeling of elephantiasis; and Biett relates a case where the swelling of the face proceeded to such a degree as to present the appearance of the most frightful form of this disease, with the additional circumstance of the livid hue proper to lupus. Such an excessive tumefaction is, however, a very rare effect of the disease.

It may continue for years without producing any serious consequences of a constitutional or of a local nature, save the existence of the morbid state of the skin just described. Of itself it has not the least tendency to healing. If it does not go on increasing, it remains inert for an indefinite period. It appears to be much more under the control of internal medicine than the former species. When it begins to yield to the action of any remedy, the livid patch of skin, and particularly the tubercles, show signs of an unwonted activity by becoming a little hot and painful, and the colour changing to a deeper red; the hypertrophy then gradually diminishes, and the skin slowly recovers somewhat of its own suppleness and texture, but it never returns entirely to its original state. Its cure has been brought about by the accidental occurrence of an erysipelas, attacking the skin beside the lupoid patch. The encroachment of the inflammation on the morbid structure roused the torpid state of the latter, upon which a new and healthy action followed, which removed the disease.

[M. Andral, (*Cours de Pathologie Interne,*) affirms, that the presence of erysipelas is the most favourable condition for the cure of lupus; and he suggests, that it would be advantageous if we could induce erysipelas artificially in such cases.]

We must here notice a form of the disease in which this second species is complicated with the first. It is as frequently met with in practice as the second form, and is more difficult to deal with, because we have not the same hopes from internal remedies, which are sometimes successfully employed in the latter; nor can we use the local escharotics with the same prospect of advantage as in the first form where the disease is more circumscribed. When the affection is of this compound nature, it begins with a tubercle of the first species, which becomes covered with the crust, as before described. A very ordinary place for its commencement is under the lower eyelid, and here it produces very serious effects by the destruction which sometimes ensues. Tubercles of the character of the second species make their appearance at an indefinite period after those of the first have been going on, and the livid hypertrophy of the skin accompanies it. Here, then, the two kinds of lupus already mentioned simultaneously exist and modify each other. The deep ulceration of the first kind is sometimes cicatrized by the hypertrophic action which accompanies the second species, but still new tubercles from which become encrusted and have the ulcerated character in the adjacent spots. This is the course of a case at present under the author's observation. In a woman aged forty-five, a tubercle of the first species appeared at the angle of the eye; it formed crusts and ulcerated during eight months, when others of a softer nature and more livid colour sprang up beside them; in its progress it reached the edge of the nose, and here took on the character of the hypertrophic lupus; but there always remained one of the tubercles with the crusts and the deep ulceration of the first species;—the disease having spread across the nose, and in one spot sunk so deeply in it that the mucous membrane became affected. About fifteen months after its commencement it developed itself on the hard palate and spread towards the velum. A perforating ulcer, which succeeded to a hard tubercle of the first kind, is now nearly closed by the cicatrization which is going on around it. This case affords a good illustration of the kind of affection which we describe as a combination of the first and second species. The double character of ulceration in depth and hypertrophic cicatrization was evinced both in its first development under the eyelid and on the nose, and in its posterior eruption on the roof of the mouth.

Besides this combined form of the malady, the first and second form may exist separately at the same time. Whilst the hypertrophic lupus is manifested on the forehead or the cheek, the eroding species may be pursuing its course on the alæ or tip of the nose. It is sufficiently common also,—and we should have mentioned this before, as it occurs not infrequently in the first form,—to find pustules of impetigo in the neighbourhood of the lupoid patches. A crop of these impetiginous pustules often form scabs across the nose, while the tip is engaged with the more intractable lupus; but generally there are observed but a few scattered pustules in some locality adjoining the latter, as, for instance, on the nose, lip, or cheek. This complication of lupus has given occasion to some writers to make use of the term impetigo erodens.

3. *Superficial Lupus.*—The third form of lupus is that which ulcerates superficially. Biett describes this species first; and were we to classify the species of this disease according to the comparative frequency with which they occur, we should have followed his example. We have, however, doubts whether this species can in reality be regarded in the light of a variety of the true lupus. It appears to us to differ very widely from the first species, the real *noli me tangere*, which, as we have before stated, is the true type of the disease. It has, indeed, considerable affinity to the second form in external characters, but we think it generalizing too much to consider it as congenerous with the lupus of the nose. As the points of resemblance which it bears to the second form may induce some to regard the latter as a kind of link connecting this superficial ulceration with the first form, we shall give its description here, and superadd some considerations developing our views of its nature.

The history of this third form is not so uniform as that of the last; the superficial destruc

tion which is essentially its character arises variously and proceeds in different ways. The variety which allies it to the second species originates by tubercles, or rather tuberosities, in the skin, large and soft, and differing little from the surrounding parts in colour. These remain for a long period indolent, but as they increase in size, and grow beyond the skin's level, they assume a dusky livid colour, which spreads to the adjacent skin for a considerable space. Ulceration at length commences on the surface of the tuberosities, and as their bases have become by this time nearly joined, as the ulcerative process spreads, it presents often, for a large extent, but one continued surface. A thin ichor is secreted by the surface, which sometimes concretes on the edges into closely adhering scabs; but these are not like the solid crusts which cover the tubercles in the first species. The ulceration has a great tendency to extend its ravages, and in doing so it does not spread by direct absorption of the skin, but by the renewed production of these tubercular indurations which had originated the disease. A circumstance which is remarkable in its history is this—that often, while ulceration breaks out in the new tuberosities, it closes up in the old places, and in this manner it has been known slowly to travel over a great space. The cicatrices which it leaves behind are of the most disfiguring kind, but they are not painful unless pressed upon, or when the patient indulges in spirituous liquors, in improper diet, or excessive exercise. If they be situated where there is a depth of soft parts, they are puckered, and evidently engage the subcutaneous cellular tissue. Even under the best directed medical efforts it is a long time before the ulcerative process entirely leaves these cicatrices. There remains generally at the inferior extremity of the cicatrising surface a spot which refuses to heal, and from this the ulceration is ready to spread again if the medical efforts be relaxed, or from very slight causes. And even when they become perfectly healed, they are often the seat of a new outbreak of the disease. In such instances they become deeper and more extended, and resemble very exactly the scars left by deep and extensive burns. If they occur near any of the natural openings, they may produce much impediment by narrowing these in their puckered growth; and besides this inconvenience, if they occur at the mouth they give rise to a very disfiguring aspect by contracting the commissure of one of the lips, and thus destroying their symmetry. These marks are often observed on the face and neck; and they are not less common on the skin of the thorax and the extremities, where they are often of a very great extent.

Marks of a similar description are often met with which have ensued on a very different process. We find on the face and on the extremities cicatrices which have not been preceded by any tubercle or even by any ulceration. The following is their manner of forming. The skin takes on a reddish hue, and appears a little swollen. After a short time, on this morbid part a slight exfoliation commences, and by this process the skin becomes plainly thinned. When this has continued for a certain period, the skin becomes pale again, and even less coloured than the sound surface adjacent to it. It becomes also smooth and glossy, and this makes a difference between the cicatrices which remain after this affection, and those ensuing upon the tubercles and ulceration, in that the latter are more or less puckered. The cause of this difference is obvious. In the affection we at present describe, the superficial layers of the skin are nearly exclusively engaged in the exfoliation; while, as we have seen, the morbid process is much more deeply seated where the scars ensue upon the tuberosities and ulceration.

There is another affection of the skin, of an analogous character, which deserves to be placed in juxta-position with the last variety. In this the deep layers of the skin and the subjacent cellular tissue are exclusively the seat of the disease. It manifests itself by the skin assuming a livid colour, and becoming hard and stiff. This may remain for many months without showing any actual disorganization. At length, probably by the formation of a small abscess arising from the irritation of the sloughing cellular tissue, the destruction which has been going on in the deep parts of the skin is brought to light. From the opening made by the abscess, which is generally enlarged by the practitioner, if he has not originally made it, a large quantity of sloughing cellular tissue of a yellow colour and firm consistence will be discharged. On the dislodging of these sloughs and the use of appropriate dressings, deep cicatrices slowly form, similar to those above described. The few cases of this affection we have witnessed occurred on the leg. We notice it under the head of the superficial form of lupus, notwithstanding that it affects the deep layers of the skin and the subjacent tissue, because it bears an analogy to it in progressing in a horizontal direction. It appears in fact to differ from the variety last described only in affecting the deep layers instead of the superficial.

These are the varieties of the form of lupus which destroy superficially. Doubtless the chronic nature of its progress, the purple colour which generally more or less attends it, and its frequent origin by what we have denominated tuberosities (to distinguish them from the tubercles of the first form), are circumstances which show a seeming analogy between it and the other species, particularly the second; but notwithstanding these, we imagine that those who have given attention to the subject will think that we are justified in doubting the propriety of making it congenerous with the other forms, at least with the lupus of the nose. It appears to have a different constitutional origin; it is curable by different remedies; and it terminates differently. In several cases of this nature which we have observed, it happened in persons who were at one time the subjects of venereal disease. In some others we think it could be traced to that analogous state of the system produced by courses of mercury. But much more frequently it depends on scrofula. In short it appears to us that it is decidedly a scrofulous disease. This idea is rather strengthened than opposed by what we have just remarked as to its sometimes being found connected with a syphilitic or mercurial taint in the system, as it is known that the sequelæ of mercury or of syphilis are

easily developed in a scrofulous constitution, at the same time that the latter modifies the nature of the resulting affection. The variety of this third form, which spreads by the superficial ulceration of the tuberosities, is evidently the same with the so-called scrofulous ulcer. Biett does not recognise this in terms, but we apprehend that it is easily to be collected from his description of the affection. It is without doubt to this species that Rayer alludes in his list of synonyms, where he enumerates "ulcères scrofuleux, scrophule vulgaire vasculeuse." But it appears of still more importance with respect to the nature of this superficial ulceration to establish its identity with the esthiomenic or corrosive scrofula of M. Lugol, in which the iodine has proved such a powerful agent. And with regard to this we know that some practitioners have been successfully employing this remedy against it without being aware that there existed any doubt as to its scrofulous origin, or that it was included under the name of lupus in the works of writers of authority.* The success of iodine in this superficial ulceration, while it seems an evidence of its scrofulous nature, may be regarded as one criterion of the difference of its nature from the two former species, for against these it is found to possess little or none of the virtues which have given it such a high place in scrofulous affections. Where we state our opinion of the relation which subsists between the two first species and scrofula, it will further appear what connection this third form stands in with the other two.

Having thus described the phenomena and course of the different species of the disease, we have here to mention some particular accidents which its destructive nature sometimes gives rise to from its occurring in certain localities. One of these, which has attracted much notice from its disastrous consequences, is the destruction or eversion of the lower eyelid. This occurs in the first form, or probably still more frequently in that combination of the first and second which we have described. One or two tubercles having formed just under the eyelid, their ulceration perforates the conjunctiva, and goes on to destroy a great part or the whole of the lower lid. Besides the shocking disfiguration which this produces, more serious effects follow. The protection which the palpebræ afford the eyes is by this interrupted; the tears escape through the broken surface instead of by their natural channel; and inflammation of an unmanageable kind ensues, which causes loss of sight on this side by producing opacity of the cornea. The puckered cicatrices sometimes form under the lid, drag it down, and thus produce its eversion. Epiphora and its consequences follow here as inevitably as where the lid is destroyed, if it be not prevented by surgical means, which are more available in this case than the former.

When the nares, the velum, or the palate are the seat of the disease, the voice is always more or less altered. It is only, however, when the destruction is very great that the articulation is entirely lost. Partial deafness is sometimes produced when the disease affects the Eustachian tube, as occurred lately in a case which happened to the author, where the disease spread from the nares and velum. When the disease has its seat in the superior parts of the nasal fossa, it may produce destruction of a fatal nature. Lallemand (Lettres sur l'Encéphale et ses dépendances) is of opinion that in many of the cases recorded by old authors, where abscess of the brain broke and discharged pus by the nostrils, the latter was produced by caries of some of the bones forming the roof of the nares. This is a situation in which lupus occurs more frequently than is at all supposed. The considerations which this writer offers in proof of his positions, are, we think, quite satisfactory, and apply to lupus; for we are persuaded that caries of the bones of the nose is much more frequently the effect of this disease than of all the other causes to which it might be referred. The occlusion of the nares has been already referred to. This event may occur even in the early stages, where the destruction commences by the falling of the crusts from time to time, and all throughout its course there is a tendency in the swollen edges to unite by cicatrization.

Such accidental results of lupus are amongst its most important consequences. Some of them are rare, but it appears highly necessary to know beforehand the tendency to their occurrence, that we may be watchful when the disease exists in any locality exposed to them, if by any means we may be able to devise a treatment calculated to arrest them ere they proceed to such disastrous effects.

There is in lupus little or no sympathetic disorder of the system: it is quite unaccompanied by fever. The gastro-pulmonary mucous membrane, which is so frequently either primarily or secondarily affected in other diseases of the cutaneous tissue, is very rarely affected. The disease may exist for several years, and in this period effect a great destruction, while the general health retains a perfect integrity. Biett mentions that in cases of extreme malignity, where its ravages proceed unchecked by nature or by art, death has been known to happen from the supervention of a chronic gastro-enteritis attended by a slow fever and colliquative diarrhœa. This termination has, however, been so rarely observed that it may be doubted whether the internal affection and fatal result should not be considered as accidentally occurring during the progress of the lupus rather than depending on it. However this may be in certain peculiar instances, it is a well-ascertained character of the disease that its ravages give rise to a remarkably trivial amount of general disorder although it usually happens in individuals of weakly constitutions.

* Confusion must daily occur as to this malady from our inattention to precision in names. Rayer's synonyms are, "Dartre rengeante, herpes esthiomenos (herpes exedens, *Biett*), ignis sacer, formica corrosiva, lupus vorax, noli me tangere. Scrofule vulgaire vasculeuse, ulcères scrofuleux, &c. Every day adds to these, for it would appear that every one relating a case considers that former appellations may be disregarded, and that he may change or add according as some peculiarity of the case or his own ingenuity supplies him with new terms. Thus, in the account of two interesting cases of this superficial ulceration detailed in the Medical Gazette, December 15, p. 367, they are denominated "strumous phagedenic ulcers." A copious supply of names is a proof that the subject has not been reduced to clear limits; but adding to them *ad libitum* only increases the difficulties, and in fact virtually does away with the utility of nosological arrangement altogether.

Causes.—It is very rare to meet any of the varieties beyond the age of forty, so that it is to be considered a disease of youth. Between the ages of six and sixteen it is more common than at earlier or later periods. It appears that the female sex is more subject to it than the male. This has been satisfactorily established to us from the observation of a considerable number of cases. It is also a fact that it is particularly prone to occur in those weakly lymphatic habits in which the period of puberty arrives late, and the menstrual function is feebly performed. Authors assert, and we believe experience proves it to be true, that it is much more common in the country than in town, and in places where vegetables and fruits form the chief food. In the city of Dublin, where the poor are inured to poverty and uncleanliness, it is very commonly met with, although some of the worst cases which are found in the hospitals come from the country parts of Ireland.

Pathology.—The predisposing causes are important elements in considering the pathological nature of lupus; and in treating of the latter we would be understood as particularly referring to our first two species, for we regard the third, as we have before stated, to be a true scrofulous malady. We must consider also that Rayer had in mind this form of the disease exclusively, when he asserted that nearly all the individuals in whom the tubercles of lupus occur have been known to be subject to scrofulous affections in their youth, such as glandular swellings in the neck, groins, or axillæ; for such an incontestable proof of its scrofulous nature can refer only to the superficial ulceration, and can by no means be truly predicted of the first two species. But, although this be the case, we cannot overlook the fact, which is evident from considering the last paragraph, that the state of constitution in which scrofulous diseases manifest themselves, and the circumstances which predispose to their development, are also particularly favourable to the production of lupus. On the other hand, it is also certain that the latter considerations are quite insufficient to establish it as a scrofulous disease, as it is found in persons of quite the opposite diathesis, and more particularly because it resists the remedies which are found so beneficial in scrofula. It was for a long time reckoned to be a cancerous disease; and it would be wrong in a discussion concerning its nature to omit mentioning this opinion. The progress and result of lupus give some colour to the notion of its affinity with cancer. Such loose resemblances, however, have never been sufficient to allow accurate pathologists to recognise their identity. Many of the oldest physicians already marked some of the distinctions between them. Celsus, as we have seen, distinguished them with particular accuracy. Wiseman, and others of our early writers, also laid down excellent rules for making a diagnosis between them. Without entering here particularly into their differences, we content ourselves with remarking that the symptoms, both local and constitutional, are quite different in the two diseases; and that lupus is as decidedly distinct in character from cancer as it is from scrofula.

But notwithstanding that it is impossible to identify it on the one hand with scrofula, as some writers do, or to reckon it as a form of cancer, it seems to us that in searching for its true nature, it may be profitable to recollect the frequency of its occurrence in scrofulous constitutions, and not to lose sight of the circumstances in which it resembles cancer. Now, with regard to the latter, it may be remarked that the hypertrophic state of the skin in our second species is not unlike the deposit of a new tissue, and also that in our first, which we have often laid down as the type of the true lupus, the ulceration is as unsparing in its destructive course as cancer. Besides the true cancer, there are cancerous ulcers which come still nearer the lupus of the nose in character, and cancerous tubercles which differ indeed from the tubercles of lupus in some important particulars, but still they appear to show an approximation in the character of the two maladies. Dr. Jacob has given the history of three cases of an interesting kind in the fourth volume of the Dublin Hospital Reports. Notwithstanding his arguments to prove that they are neither cancer nor lupus, it appears to us that their description answers perfectly to the character of the latter carried to a great extent. At that time the history of lupus was comparatively but little known, and scarcely any good account of it was to be found in books. Ravages to so great an extent are seldom found in this situation resulting from lupus or even from cancer, but the description answers so well to the former disease that no doubt exists in our minds but that it was really lupus.

Were we called on to declare our opinion of the essential character of lupus, we should say that it is an intermediate pathological state between cancer and scrofula, partaking somewhat of the nature of both, but constituting a state in which, by the blending of these two diseases, many of their peculiar characteristics are lost. In the lupus of the nose the double nature appears so proportioned as for each to neutralize the other more perfectly than in any other of the forms; and departing from this on either side, pathological gradations can be traced which degenerate to true cancer on one side, and on the other, passing through the hypertrophic and superficial lupus, lose themselves in scrofula. Besides the considerations offered above in support of this view of its nature, we consider that it is much strengthened by other circumstances, as, for instance, the action of iodine, carbonate of iron, and arsenic on the respective varieties. The first of these is found to possess signal virtues in the third form, which is a scrofulous disease; it is much less useful, if it have any effect, in the second form; and it is quite inert in the first. Whatever powers the arsenic and carbonate of iron possess, are almost exclusively available in the first form; and it may be remarked that, while they have no efficacy in scrofulous diseases, they sometimes are found to palliate affections of a cancerous nature. Although this view of the pathology of lupus has not, as far as we know, been advanced before, we put it forward with some confidence, as we think it accords with the facts which are known on the subject. But the question demands much ulterior discussion, in accordance with that cautious spirit of laudable scepticism which the modern cultivators of medical science have been taught to use in weighing the worth of pathological doctrines.

The influence which a syphilitic taint in the constitution has in the production of lupus acts in two ways. One, the most obvious, is, where it gives rise to a secondary syphilis, assuming the character of lupus, but to be distinguished from it, as we shall immediately point out. Another effect is to predispose to the true lupus. How far these may be really differences only in degree of the syphilitic infection of the constitution, we will not pretend to say, but in practice the two states occur. A striking case, which the author has observed, will illustrate our meaning. A woman, aged forty-seven, came from the country with an extensive lupus of the nose and of the palate; it was that combination of the first and second species which we have described above. She had had primary venereal symptoms seventeen years before, but no secondary disease of the skin, throat, &c. ever followed. She has borne eight children since, of which the first six died either before or immediately after birth. This was the way in which the disease showed itself. She herself attributed the death of her offspring to the contagion of syphilis; and there is no doubt but that she was right, as two of them came away in the putrid state, which is not an uncommon effect of this virus on the fœtus in utero. Her two last children, however, lived and enjoyed good health. The lupus has now existed two years, and has never exhibited any of the external characters of the venereal affection, which it is sufficiently easy to distinguish. This, then, is an instance where the original syphilitic taint predisposed to the formation of lupus, without impressing on it the marks which denote it to be a form of secondary syphilis.

A vague opinion was once entertained that the scanty pus which the ulcerating tubercles supply is contagious, and that it propagates the malady on any part of the body with which it comes accidentally in contact. This notion survived the old error which was so long a time prevalent in the schools, that all pus was corrosive; for even when it became established that purulent matter was a bland instead of an irritating fluid, exception was made in respect of that formed by some kinds of ulceration, and lupus was amongst the number. In fact, it is still imagined by many that the pus which oozes from the ulcerating tubercles is the means by which the slow destruction is effected. That it produces any specific effect as a direct chemical corrosive, is, however, no longer tenable; nor can it even be admitted that any considerable action is to be attributed to whatever irritating properties this discharge possesses. If it drop from the nose upon the hand or arm, it produces no perceptible effect. A patient with lupus of the nasal fossæ, in whom we had an opportunity of confirming this, yet complained of a smarting from it as it trickled through the nose. While, then, it is denied that the pus has any specific agency in the destructive results of this disease, it must be supposed to maintain more or less irritation on the ulcerating surface, as is the case with common ulcers which discharge an ill-conditioned sanies.*

Diagnosis. — It may be easily imagined that the diagnosis of a disease of such obvious characters as lupus will be made with facility. This will be rendered more certain if a clear knowledge of its different species and their stages be kept in mind. But, as it has been often confounded with other diseases, it will give us much confidence in our diagnosis to be forewarned of the affections which might lead us into error. We shall, therefore, point them out briefly with their diagnostic marks.

The pustules which constitute the elementary form in acne are succeeded by round indurations, which have a deeper purple colour than the surrounding skin. When these collect in clusters, as they sometimes do, near the point, or on the alæ of the nose, they have some resemblance to the tubercles of lupus in their first stage, and have been mistaken for them. This error will be avoided by attending to the different nature of the tumours in question. In acne they have been preceded by pustules, some of which are probably still to be met with in parts where the affection is least advanced, and besides this there exists round the base of the tubercle in acne a dull redness from which the lupoid tubercle is quite free, as the latter makes its way slowly over the skin without any marks of inflammation; for the violet discoloration which precedes it does not deserve that name. The hypertrophic lupus, when situated on the nose or forehead, is also not unlike acne, but the history is very different, and even a slight attention will discover the cicatrices which lie between the tuberosities in the former, and thus at once distinguish it.

It might be sufficient to mention the possibility of mistaking the crusts which form in certain kinds of impetigo and porrigo for lupus; but notwithstanding their general dissimilarity, the mistake has been made. The mind is preoccupied with the idea of lupus in every incrusted appearance which is met with in the alæ nasi or its immediate neighbourhood, and these pustular affections sometimes occur here in a very chronic form. In examining the case then, we must search for the primitive form of the eruption which has furnished the crusts. Small pustules will be more or less obscurely detected, with inflammation in the skin diffused between them, if these belong to porrigo or impetigo. Moreover, the crusts which might cause the mistake are quite opposed in their character to those of lupus, being irregular, soft, and easily detached; while in the latter, as we have frequently had occasion to state, they are of a firm consistence, and confined for the most part to the surface of the tubercle which forms them, and to which they generally adhere with great tenacity.

It is stated by authors that the elephantiasis of the Greeks is liable to be confounded with the hypertrophic form of lupus. But the tuberosities which occur in elephantiasis are round, knobby, and of a dusky sallow or fawn colour, which overspreads the whole face. If even they be con-

* See the sixth number of the Edinburgh Medical and Surgical Journal for an account of a curious case related by Dr. Grenville, under the name of "Herpes exedens vermiculatus," in which a very copious discharge which an ulcer furnished was proved by experiment to possess the power of generating the same ulcer in a part inoculated by it. On microscopically examining the pus, it was found to be full of animalculæ of various shapes and sizes.

fined to the face, they spread over it here and there, not affecting (as this form of lupus) the arrangement of a circumscribed patch. In some aggravated forms of this disease the tuberosities ulcerate, and furnish black crusts, which might impose on an unwary observer for lupoid incrustations; but tuberosities will be found, which have not gone on to ulceration, presenting the marks of distinction before laid down. This malady, besides, is rarely confined to the face, and when it has made some progress, it is attended with constitutional symptoms which do not belong to any form of lupus. Finally, its great rarity in this country prevents us from being often put to the necessity of making the comparison, while our knowledge of their points of resemblance will keep us from being off our guard.

Cancer is an affection which must be carefully distinguished. Whether the affinity which we suppose to exist between them be grounded in fact or not, it is of the utmost practical importance to separate the two diseases when we have to consider them with regard to treatment. Some cancerous tubercles commence with a warty tubercle, having a considerable resemblance to incipient lupus. It will, however, be observed that they are for the most part solitary, while the lupoid tubercles are scarcely ever so, at least for any length of time. Their bases too are deep-seated, and attached by a root which ramifies in the surrounding tissue, which is not the case in lupus. The most striking difference is the pain, which, as we have seen, is nearly totally absent in the beginning, and indeed throughout the whole course of lupus. Cancer is the seat of deep lancinating pains almost constantly, which are easily increased by improper applications, and permanently removed by none. Without multiplying points of difference, one more, with those already recited, will be amply sufficient to diagnosticate the two maladies. The circumstance to which we allude is the age of the individual. We have seen, with respect to lupus, that it is a disease of youth; but cancer is seldom or never met with below the age of forty. Biett is desirous of appropriating the name *noli me tangere* to cancerous tubercles, but at the same time insists that it should be carefully distinguished from lupus. We have not adopted his suggestion on this head, because we think it would only serve to confound the affections, which we are desirous with him to keep separate. There has always existed much discrepancy between the French and British ideas of cancer, and it would undoubtedly only serve to increase it were we to assign to this disease a term which has been hitherto uniformly appropriated to lupus.

Syphilis assumes the guise of this malady, as it does that of most other cutaneous diseases. We shall not here discuss the important theoretical question, whether we are to consider diseases of the skin produced by a venereal infection of the constitution the same actual diseases as when they occur unconnected with any constitutional taint, or whether we are to regard them as a class *per se*. For the exposition of this problem we refer to the article Syphilis. It is, however, of undeniable importance to have the means of distinguishing ordinary lupus from that of venereal origin. The crusts which form in the syphilitic affection are much darker coloured than those of the genuine lupus, and the surrounding skin is of a dark copper hue. The tumefaction which more or less attends the real lupus is absent, and the crusts are dry and permanent, and very seldom give place to any open ulceration. If the latter do ensue, it is to be recognised by the well-known characters of the syphilitic ulcer which infallibly attend it, viz.—the deep centre, and the raised, hard, and swollen edges. We have lately seen a case of syphilitic rupia, situated on the point of the nose, which at the first view we mistook for lupus, but on a little closer examination we found that the only point of agreement was the situation of the scabby crust. It was dry, hard, and flat, adhering to the tip of the nose with still greater tenacity than the crust of lupus. There were present also symptoms of venereal affection in the throat, and the patient had had venereal iritis. These were quite decisive of the question in themselves. In investigating doubtful cases, these additional constitutional symptoms should always be sought for, and the history of the disease obtained. But as to the latter, it must be remarked that negative evidence is not to be held decisive, nor is it even of much value if the other marks be present, as it is well known that patients will often refuse to admit the possibility of their having had syphilis, while undeniable proofs of its existence are manifest. There is a syphilitic affection which commences in the cartilages and bones of the nose, and having destroyed them by caries, attacks the soft parts. The bones having yielded, the nose becomes flat, and the alæ expanded. In this state, the affection might be confounded with the hypertrophic lupus, for the root of the nose becomes somewhat swollen and livid; but it will be seen that this description differs from lupus in its progress, its appearance, and its results. It will be unnecessary to compare them more minutely.

Treatment.—The treatment of lupus has, from the earliest periods of medicine, been an object of great importance in practice. It does not put the life of the patient in jeopardy, but the hideous ravages which it effects, and the sure though slow progress with which it marches, render it a formidable disease. Yet, intractable though it be, its sanability by the efforts of medical art is perfectly ascertained. Cases are even to be met with where a spontaneous cure has taken place by the cicatrization of the surface. Where this does occur, it generally belongs to the first form, and the cicatrix is perfect and permanent. There is much less security in the cicatrices of the other species. When the malady is left to itself, such a termination is very rare, and must be regarded as the exception; for the destruction seldom ceases till the nose is nearly level with the face, and then, which is a remarkable circumstance, it sometimes does show a tendency to stay its ravages. In many cases, however, it continues its progress on the cheek to a fearful extent. Experience teaches us, on the whole, to employ the means in our power sedulously and with vigour, and encourages us never to lose hope of arresting its progress; but it also lays before us the difficulties of a most obstinate disease, and cautions us against being too sanguine in our prognosis.

The treatment resolves itself, in this, as in most cutaneous affections, into general and local means. We have seen that the system shows but little sympathetic action in this disease: we should not, therefore, *à priori*, expect that internal remedies would avail much; they form a part, however, of every well-digested plan of treatment. In some cases their efficacy is more considerable, and many cases will occur where they will demand our first and most particular care. On the other hand, the disease will be found in some patients who are in such good general health that it would be inexpedient to lose any time in the exhibition of general remedies. In these the local means will form the main resource, and whatever others may be employed will be directed rather to obviate particular symptoms than to make any impression on the disease through the constitution.

a. Internal Remedies.—When a cachectic state of the system accompanies the malady, if its cause be recognised we must apply all our resources to remove this. If this ever stands to lupus in the relation of cause and effect, it is where it happens in the poor, when indigence exposes them to unwholesome and insufficient diet, with cold and uncleanliness. The low, torpid state of the system which these induce will be evidently best obviated by reversing as much as possible the condition of the patient, substituting a light animal diet, and all the comforts which hospitals and other public or private charities afford. If we can detect any diseased action in the chylopoietic viscera, this will receive a particular attention; for whether this be regarded as a cause or merely as a concomitant effect, no favourable change in the local malady should be anticipated as long as it remains. Gentle aperients and tonics will tend much to the gradual improvement of the system. Occasional doses of the pilula hydrargyri and pilula rhei composita will be a useful remedy when the liver is found to perform its functions torpidly. The old authors, who looked so much to the state of the blood in pathology, attended much to the use of such remedies, and their practice in this disease is not thrown into the shade by any in the present day.

If the individual be obviously of a scrofulous habit of body, he should be kept steadily under the use of appropriate internal remedies for some time. This should be done whatever be the form of the malady with which the patient is affected. But, as we have already stated, the superficial lupus will be the form usually met with in such constitutions, and therefore that for which an antiscrofulous treatment is particularly calculated. For the remedies proper to be used, we refer to the article Scrofula. We may mention here, however, that our experience of iodine has inspired us with great confidence in its efficacy. We have seen striking amelioration produced by the use of the solutions which Lugol recommends. The proto-ioduret of mercury is one of the preparations of iodine which has proved of most utility. The ulceration has been observed to heal under its use with a rapidity which is quite foreign to its indolent character. The fourth part of a grain was given twice a-day to a girl of fifteen years of age, who had a large patch of deep ulceration, with tubercles, on the front of the leg. After ten days of its use, the mouth became affected, contrary to the intentions of the physician, and in three weeks' time an ulceration which had been forming a year and a half was almost cicatrized. We should add that the iodine was used externally, also, as a lotion, and in cataplasms. Its efficacy, however, appears to be confined to the third form, as whatever trials have been made with it in the lupus of the nose, or even in the hypertrophic form, have quite disappointed expectation.

[Iodine, in combination with mercury, has been found especially beneficial. Blasius advises it internally and externally; and it has been recommended highly by Dr. J. W. Schmidt, Jr. of New York. Both the iodide and red iodide were given by him. (*Amer. Journ. of the Med. Sciences*, Feb. 1840, p. 301.) Recently, the iodide of mercury and arsenic has been greatly extolled in the form of the *liquor hydriodatis arsenici et hydrargyri*, or what has been called, from the preparer, "Donovan's solution." (*Dublin Journ. of Med. Science*, Nov. 1839, and Nov. 1842.) It is given internally as well as applied externally, and the writer has found advantage from its use not only in lupus, but in many obstinate cutaneous affections. (*New Remedies*, 4th edit. p. 353: Philad. 1843.)]

The muriate of barytes was commended by Bateman for its efficacy in promoting the resolution of the tubercles. It does not appear to what species the latter belonged in which he employed it, but later authors object to its use, that it is a dangerous remedy from its energetic action on the stomach. The muriate of lime has been proposed as a substitute, having the same properties, and free from these objections. One drachm of the *solutio muriatis calcis* is to be mixed in a pint of water, of which a table-spoonful may be given once or twice a-day at first. This is to be progressively increased after a few days, till ten or twelve spoonsful be taken daily. Preparations of iron have been at various times extolled. The muriated tincture and the carbonate are more relied on than any other. The latter, particularly, has been set forward with a zealous advocacy by writers who confounded the noli me tangere with cancer. It is doubtful whether they are entitled to any confidence in either, but as the cases in which they have been reported to have effected a cure were undeniably lupus, they deserve a trial.

Arsenic is a remedy which has been extensively employed, and the authority of most writers agrees in recommending its internal use. It is found to exert considerable influence in checking the progress of the tubercles, and even in altering the character of the ulcerated surface. It is variously administered. It forms the active ingredient of *the Asiatic pills*, a medicine which enjoys great reputation on the continent.* Fowler's solution is the preparation which is most approved of in these countries. This is to be commenced with the small dose of three drops, to be taken thrice a-day: it may be gradually increased to ten drops, but the greatest vigilance is to be observed during its exhibition. (See Lepra.) Practitioners of merit prefer minute doses of corrosive sublimate,

* They contain about one-thirteenth of a grain of white oxide of arsenic, and somewhat more than half a grain of black pepper in each pill.

carried to the extent of touching the gums, to any other internal means. It would be unprofitable to swell our catalogue by recounting other internal remedies whose effects are more doubtful, and we believe that those above mentioned comprehend all that have gained any merited reputation.

b. External applications.—These form by far the most important part of the treatment, and indeed often constitute the whole of it. It is always in combination with these that the efficacy of internal remedies has been developed, for no one would think of relying on the latter without using some of the local applications which have been at all times the essential therapeutic resource.

The local applications are of two kinds: *first*, those which are intended to exalt the vitality of the part, and thus to promote the resolution of the disease; *secondly*, those which, acting as cauteries, destroy the morbid part, and excite a healthy action in the surface beneath it.

The stimulating applications may be tried where the disease presents itself in the stage of tubercle. The attempt to effect the resolution of the malady will be more feasible in proportion to the earliness with which it is made, and also to the activity which the surrounding skin appears to possess. If the skin show that the circulation is actively carried on, it will be often useful to apply a few leeches to the neighbourhood of the tubercles before commencing the use of the resolvent applications. Dr. Mac Farlane has experienced the good effects of such a plan, and recommends it in these words: "Sometimes the progress of a lupoid tubercle may be arrested and the ulceration prevented by the application of leeches round its base, especially when the tumour is painful and covered by inflamed integuments. This, followed by evaporating lotions and alterative doses of calomel, will not unfrequently subdue the inflammation upon which the progress of the disease depends, and reduce it to that indolent and chronic state in which friction with an ointment, containing the ioduret of zinc or mercury, may be beneficially employed to promote its absorption." These ioduretted ointments are topical applications of decided efficacy; [and the same may be said of creasote ointment, and the tincture of iodine.] Besides these, Biett is in the habit of using the ioduret of sulphur, made, as the metallic iodurets, into an ointment, in the proportion of fifteen grains to an ounce of simple ointment. This is to be applied with gentle friction to the tubercles and the skin surrounding their bases. It stimulates the skin powerfully, and has a greater resolvent effect on the nascent tubercles than any other similar application. Rayer objects to its use in this manner, that it is apt to produce erysipelatous inflammation of the surrounding skin; but this is an infrequent consequence, and when it does occur is not to be deemed an injurious effect; on the contrary, it has been observed to be a means of dissipating the disease by communicating its sthenic action to the torpid tubercles.*

In the hypertrophic lupus the employment of these resolvent ointments is particularly indicated; indeed, in this form our hopes of cure must depend chiefly on such applications, aided by an appropriate internal medication.

[The *oleum jecoris aselli*, codliver oil, may be used in alternation with any of these ointments.]

When the tubercles are once ulcerated, or when they are already far advanced towards this point, those stimulating applications are too feeble to be further of any efficacy. There is one lotion which comes under this head, which some experienced practitioners still confide in; we mean a solution of arsenic of such a strength as to produce only its specific stimulating effects on the sore, in the hope of changing its action. The solution of Fowler contains the arsenic in the best proportion for this application; with this the surface of the tubercles should be sopped twice or thrice a day, when this method is judged expedient. It is generally agreed, however, that it is the wisest practice in such stages to have recourse at once to escharotic applications.

Arsenic is the substance which is almost universally allowed to be the most suitable escharotic which we have the command of in lupus. This has been anciently established, as we find it first on the list of the "*medicamenta adurentia*," which Celsus proposes. Its superiority over the other caustics appears to consist in this, that it produces a slough promptly and certainly, which confines itself to the parts immediately touched by the arsenical preparation. The methods of employing this powerful mineral have been varied by different practitioners. Justamond's application was once a very favourite form. This is made by fusing in a crucible two parts of sulphuret of antimony and one of white oxide of arsenic. The resulting compound, being pulverized, is of a blue colour. Sir A. Cooper is accustomed to use an ointment consisting of white arsenic and sulphur, a drachm of each, mixed with an ounce of spermaceti ointment. He directs some of this to be spread on lint, and to be applied to the ulcer for four-and-twenty hours, at the end of which it is expected that a black slough will be formed, and when this falls, the surface is to be dressed with simple ointment. Other eminent practitioners employ it mixed with simple ointment alone, rejecting the admixture of any other substance to modify its action. When we desire to apply it to indolent tubercles, it is sometimes found that these are covered by a thick cuticle, which impedes its action, for the arsenic has scarcely any effect on the cutaneous surface so long as the cuticle remains entire. Some advise that in such a case a small blister should be raised previous to its application; but this end will be probably better answered by mixing some cantharides with the arsenical ointment. Mr. Adams has successfully employed the following ointment:

℞. Unguenti cetacei, ℥ss.
Oxydi arsenici, ℈i.
Emplastri cantharidis, ℥iii. M. fiat unguentum.

He has also found that the callous edges of an

* See an interesting observation quoted in the Archives Générales de Médecine, t. xxiv. p. 584, where, during the treatment of a lupus of the nose in the state of tubercles, as erysipelas which was epidemic in the ward, attacked the patient's face. It had been very fatal amongst the individuals whom it had seized, but in this patient it proceeded no further than the face, where it ran its course safely, and at its disappearance brought about the complete resolution of the tubercles.

old lupoid ulcer, which had resisted other arsenical applications, yielded a slough freely under the use of this for a few days.

Whichever method may be selected for applying arsenic externally, a certain degree of caution will be requisite. It will be prudent to apply it at one time to no larger a surface than a shilling would cover, and having produced in this space the desired eschar, a new portion may, if necessary, be attacked. This way of proceeding is found to be very effective in establishing a healthy action in the new surfaces, as well as to fulfil the end for which it was adopted, that is, to obviate any unpleasant consequences which might arise from spreading the arsenic over a large surface. While it will be prudent to make use of this remedy with that vigilance which our acquaintance with its powerful action on the animal economy must inspire, it is to be recollected that it is a perfectly safe application. All practitioners who have been accustomed to use it testify that they have never witnessed any of its dangerous effects produced on the constitution by its regulated use. There are indeed two cases mentioned by Dr. Mac Farlane, where, being spread upon extensive ulcerations, it was followed by severe inflammation of the gastro-enteric mucous membrane, apparently in consequence of its absorption into the system. These examples are, however, exceptions, and serve rather to exhibit the rarity of constitutional disorder consequent upon its use; but they also show us the necessity of observing the cautions in applying it which we have suggested.

The arsenical paste is the application which has the most decided caustic powers, and on this account it is by many preferred to the other less energetic escharotics.* In the old cases of extensive destruction the edges acquire a degree of callousness which it requires the most potent remedies to affect; in these it is found advisable to produce a prompt and decided slough with rapidity, as it is found that less energetic means, which act more slowly, only allow of new productions under the imperfect slough, which increase the ravages sometimes to a prodigious extent, of which one of Dr. Jacob's cases is an example. (Dublin Hospital Reports, vol. iv.) In these instances and wherever the strongest cautery is required, the arsenical paste may be used. Its employment demands particular caution not to surpass a limited area in its application, as besides the results alluded to in the last paragraph, it almost invariably causes a severe erysipelatous inflammation of the face. This may in some cases be of little consequence, but it must in all be prevented from running too high by the ordinary means of leeches and proper remedies. Some habits could not safely sustain this. We should, therefore, confine the use of this energetic caustic not only to the kind of ulceration which requires it, but also to individuals whose constitution will enable them to bear the erysipelas which attends its use.

In cases where the effects of the stronger arsenical applications might be injurious, M. Dupuytren recommends a powder, whose action is, he says, specific, not caustic. It is composed of calomel and arsenic in the proportion of one part arsenic to two hundred of calomel. The quantity of arsenic may be doubled if it be required more active. It is sprinkled directly on the ulceration by means of a dossil of lint, or made into a paste with thin mucilage. It is to be left on till it falls away of its own accord, and renewed several times till it produce a new action in the ulcerated surface, and a tendency to cicatrise. This is found to be a very suitable application in children, females, and individuals of a delicate habit and irritable skin. Dupuytren applies it to unhealthy cicatrices, having in the first place produced a new surface by cauterising them, and this appears a very excellent method of employing it. Although this powder is much milder in its action than the other arsenical applications, the same cautions are to be observed in its employment, for whatever is to be apprehended from the absorption of the mineral, may as readily occur from this as from the more concentrated preparations.

The nitrate of silver and the muriate of antimony, which are so commonly used in other ulcerations, seem to be superseded by the arsenical cauterics; but the former does not deserve to be neglected; we can answer for its efficacy in changing the unhealthy surface. The concentrated nitric acid is a favourite escharotic with some experienced men. In that variety of the third form where the deep layers of the skin and the cellular membrane are the seat of the destruction, it is amongst the best applications for causing separation of the sloughs and cicatrisation.

A preparation, called "le nitrate acide de mercure," is in high repute at the Hôpital St. Louis, from the success with which MM. Richerand and Cloquet employ it in producing healthy cicatrices. It is made by dissolving a drachm of the protonitrate of mercury in an ounce of nitric acid. The ulcerated surface is to be touched with it by means of a dossil of lint, and some scrapings of lint moistened with the same solution to be also laid upon the part. Its immediate effect is very painful, but this does not continue. It is also an excellent application for the soft flabby edges of unhealthy, half-formed cicatrices, which, we should remark, are always to be treated with the same energy as the open ulcer; they are certain otherwise to relapse sooner or later into this condition.

[Occasionally, pure creasote has been applied; and Dr. Alexander Ure (*Lond. Med. Gaz.* Dec. 3, 1836; see, also, *Bost. Med. Journ.*, Nov. 4, 1840, p. 215, for a case cited from *Lond. Lancet*) found chloride of zinc speedily check, and permanently cure the disease: he applied it in a paste, made with one part of the chloride and two or three parts of the anhydrous sulphate of lime. One or two applications of the paste were generally sufficient to produce a proper eschar, and when this was detached, the sore was treated with water dressing.]

The actual cautery was formerly much esteemed in this malady, but now is but seldom employed. We believe, nevertheless, that it is sometimes amongst the best methods for obtaining a satisfactory eschar that we possess. It should never be employed, however, in lupus of the nose, for the cartilages become affected by a bad kind

*The arsenical paste is made by mixing the "poudre arsenicale" of Frere Côme with saliva into the consistence of a paste. This powder consists of arsenic, cinnabar, and burnt leather. (See Rayer's Formulaires.")

of inflammation and swelling from its use, which increases the evil. Their defective vitality is not capable of producing a slough. But where the disease occupies a different situation, it is still used with much success.

These methods of destroying the diseased surface are generally preferable to extirpation by the knife, which has, however, been practised with the most favourable result. (Nouveau Bibliothèque Médicale, t. iv.) Cases may happen where it can be had recourse to, in which the mineral escharotics are inapplicable, as, for instance, where a solitary tubercle is situated very near the eye. It is of particular importance to arrest its progress as soon as it can be recognised in this situation; but the cauterising substances would be dangerous applications in the vicinity of the eyeball; so that here, if other things permit it, excision by the scalpel will be the preferable practice.

In employing the escharotic applications, it must be a rule with the practitioner to persevere in their use till the whole of the morbid structure is destroyed. In order to effect this, it will in general be required to repeat them several times, for when the eschar falls, although the new surface present a healthy aspect, the cicatrix may form imperfectly, and afterwards break out again into open ulceration. To diminish the chances of this event, it will be wise not to trust to the destruction of the mere face of the ulcer, but rather to repeat the cautery, to procure a deeper and healthier surface, which will give us better confidence in its cicatrisation. During the progress of the latter, attention must be frequently given to the opening of the nares, as their edges have a great tendency to unite during this process. It is sufficient here to revert to the frequency of this accident, and in individual cases the ingenuity of the practitioner will suggest means to promote or to remedy it.

When the cicatrisation is accomplished, every means should be put in practice to fortify the constitution against the risk of a relapse. To this end it has been proposed to insert an issue or seton in the nape of the neck. This would be, doubtless, particularly in young persons, a wise precautionary measure. It may, however, be stated in general, that if the remedies be steadily persevered with till the malady be quite removed, the cicatrices will stand sound. The Tagliacotian operation has been performed where the nose had been destroyed by lupus. Fears were entertained that the skin taken from the forehead for the new nose would not form a junction with the old cicatrized edges cut to promote union by the first intention, and that the dormant malady might be reproduced by the operation: the union was, however, completely established, and the cicatrix maintained its integrity, because the cure had been complete.

JAMES HOUGHTON.

[NUMERICAL METHOD. See STATISTICS, MEDICAL.]

NURSING. See LACTATION.

NYCTALOPIA, Νυκταλοπία, (*th.* νύξ, ὤψ,) *Night-blindness.*—A considerable degree of confusion has prevailed among authors in the use of the term *nyctalopia*. Some have employed it to signify blindness by night, and others blindness by day; while it has also been used indiscriminately to denote either of these conditions. The most approved acceptation, [?] however, among the best and by far the most numerous authorities, would appear to be that of night-blindness, while the opposite condition of blindness by day is properly designated by the word hemeralopia. This is the sense in which the terms are used in the present article.

History and Causes.—Nyctalopia is little known in this country; but in the torrid zone, and in those parts of the globe where the heat and light of the sun are powerful, it is frequently met with. It occurs in Africa, in Asia, and in America, and is said to be more common in China than in Europe. In the East and West Indies, and in the Mediterranean, it is no unusual disease among our soldiers and seamen; and on the eastern shores, and in the islands of the Adriatic, it is at times very prevalent. It has also occasionally assumed an epidemic form in different parts of France, Germany, Poland, and Russia; and in some situations it appears to be endemic.

[The Statistical Report of Surgeon-general Lawson, (Washington, 1840,) shows, that the affection is seen amongst the troops both of the northern and southern posts, but much more frequently in those of the latter. In Florida, it is by no means uncommon.]

Wherever it occurs, it preserves the same characters, varying only, in individual cases, in the severity of its attack, in the length of its duration, or from constitutional peculiarities of the patient.

In persons affected with this disease, when the sun sets, vision begins to be indistinct, and becoming gradually more imperfect as the light diminishes, it is at length entirely suspended. The blindness continues during the darkness of night: in proportion as the day-light returns, sight is restored, and it again becomes perfect when the sun appears above the horizon. Blindness and vision continue, in this way, to correspond with the setting and rising of the sun, and the approach and the remission of the paroxysms are in general gradual; but in some instances the blindness comes on suddenly at sunset, and disappears at sunrise in a similar manner.

The degree of blindness varies. In the early stages of the disease, it is in general partial, and the patient can see objects in a clear light; but as the complaint advances, the powers of vision become more impaired. Some patients are incapable of discerning the moon or the stars, or even the light of a candle, when placed close before their eyes: and some can perceive these bodies, but not the objects which are illuminated by them; while others can barely distinguish light from darkness. After a lapse of time, varying in different cases, the blindness is often complete, and the patient cannot perceive any object after sunset, even in the brightest artificial light.

According to Mr. Bampfield, if the disease is allowed to continue in this degree of severity, the sight will, in the course of time, become weak during day-light, and the eye will not be able to bear the direct or reflected rays of the sun, without pain and temporary blindness being induced. (See Medico-Chirurg. Transactions, vol. v. p. 39; also Manardi Epist. lib. xv. Epist. ii. p. 431.)

Such cases, however, are not of common occurrence.

But even when this irritable state of the eye has not been induced, it would appear that, on some occasions, the patient, when placed in an obscure situation, (Radii Scriptor. Ophthalm. Minor. vol. iii. p. 176, 177, 179, 192. Lipsiæ, 1830,) is incapable of distinguishing objects by day as well as by night; but this state does not seem to have been often remarked, and it would appear that a condition exactly the reverse of this has also been sometimes observed. (See Lettres Edifiantes, tom. xxiv. p. 434.)

In general, there is no uneasy sensation or visible alteration in the eye, to indicate the presence of any morbid affection. Some authors, however, describe the pupil as being immovable and contracted; whilst others say that it becomes immovable and dilated, particularly during the night. These discordant accounts may, perhaps, have arisen from examinations of different states or stages of the disease; for Mr. Bampfield, whose opportunities of observation were extensive, says, that after it has continued long, and in the worst stages, the pupil is often contracted, and the eyes and actions of the patient evince marks of painful irritation, if the eyes are exposed to a vivid light, or if he look upwards." In another place he observes, "the pupil of the eye is considerably dilated both by day and night, in the proportion of about one case in twelve, and at night the pupil is often dilated, and does not perform its expansions and contractions when exposed to the moon or artificial light." (Medico-Chirurg. Trans. loc. cit. p. 42.) These were also generally cases which had been long protracted.

Although no medical treatment has been employed, the disease, after continuing for a longer or shorter period, frequently undergoes a spontaneous cure. In temperate climates, its usual duration is from one month to six weeks; but within the tropics its continuance is generally much longer, extending from a few weeks to three, six, or nine months, and even occasionally to a still longer period. On some occasions it would appear to be congenital;* and it is also alleged to be at times hereditary. (Rees's Cyclopædia, art. Nyctalopia.)

The natives of cold countries who reside within the tropics are said to be more subject to this complaint than the indigenous inhabitants; and those Europeans who have once had an attack are very liable to a recurrence of it while they remain in a warm climate.

Within the tropics, the disease may be almost considered as endemic, and does not appear to be more prevalent at one season than another. But in temperate climates it most generally occurs during or after the protracted heat and dazzling light of summer and autumn. In Germany it prevailed as an epidemic in the months of July and August; ("Calore solis existente maximo— remittente solis æstu desiit hæc nyctalopia." Halleri Disput. loc. cit. sect. 8.) and in Russia Dr. Guthrie says it is most frequent in June and July during the hay-harvest. (Edin. Med. Comment. decad. ii. vol. ix. p. 288.) All the cases which the writer of this article met with in the Mediterranean took place in the end of summer and in autumn. It is, however, by no means confined to those seasons. Hippocrates names it among the diseases that occur "circa brumam," and adds that the greater number had relapses "ante æquinoctiam." (De Morb. Vulgar. lib. vi. sect. vii.)

Even at the season of the year when the heat has not arrived at its greatest height, but when the sun is long above the horizon, the disease has appeared as an epidemic among troops exposed to much watching and fatigue. The most remarkable instance, perhaps, is that recorded by Dr. Guthrie in the Edinburgh Medical Commentaries. "I was lately desired," he says, "to give an opinion on a curious phenomenon that happened last war in Finland, where a Russian detachment, ordered to attack a Swedish post during a light night in spring, had like to have mistaken one another for enemies, and occasioned bloodshed, owing to some hundreds in the column being *blind after sunset*. The complaint seized the soldiers in spring, when the nights, from the short absence of the sun, and the strong reflection from the snow, must have been very fatiguing to the eyes, at a period of much martial vigil and alarm; surprises on both sides being then very frequent, more especially nocturnal." (Edin. Med. Comm. loc. cit. p. 285 et seq. See also Ephem. Natur. Curios. dec. iii. Ann. vii. and viii. append. p. 131.)

Night blindness has been described as endemic in different countries. We have an interesting account by Chamsem, (Hist. et Mém. de la Société Royale de Médecine, ann. 1786, Paris, 1790) of its annual occurrence in this form in France, at Roche Guyon and the neighbouring villages, in some of which it occasionally affects as many as one in nine or ten of the inhabitants. It appears every year in spring, about the middle of March, and continues for three months; sometimes also returning in the autumn. The soil is here composed of chalk and marl, upon beds of burrstone (meulière) and flint (caillou), and the disease principally attacks those who are much exposed by their labours in the fields to the reflected heat and light from this dazzling surface. As the summer advances the ground becomes covered with verdure, and being no longer capable of reflecting the brilliant light of the sun, the disease disappears for the season.

According to Richerand, the inhabitants of the northern regions, where the ground is covered with snow during the greater part of the year, become, at an early age, the victims of this disease. He also says that among artisans the same morbid state of the vision is sometimes produced from long exposure to a great intensity of artificial light. (Elements of Physiology, p. 284, edit. 1812.)

Nyctalopia is a disease more common to the labouring classes of people, and those who are exposed to much fatigue, watching, and other debilitating influences—whose diet is often scanty

* See a case where the patient, 20 years of age, had had the disease "from the first time he was able to take notice of things." Philosoph. Transact. vol. iii. p. 38. Also the case of a patient, 23 years old, who states, "se a quatuor jam annis laborare cæcitate nocturna." Halleri Disputat. tom. i. disp. xxii. sect. 2. Lausannæ, 1757. Also an account of its occurring in three individuals of the same family, in Radii Scriptor. Ophthal. Minor. loc. citat.

or even unwholesome. (*Haller.* Disput. loc. cit. sec. xx; Gregor. Horstii Oper. Med. tom. ii. lib. ii. obs. 34. p. 106; also *Chamsem*, op. cit. p. 139.) The epidemics which are referred to above were confined to persons of this description; and its frequent occurrence among our seamen leads us to the same conclusion. A few instances are recorded of its affecting individuals among the better ranks, but in such cases the habits and mode of life of the patients have not been described with precision, so as to justify us in forming a different opinion.

In many cases nyctalopia appears to be a purely local or idiopathic disease; but still more frequently it is the consequence, or at least the concomitant, of some other affection. All the instances of it which came under the observation of the writer, happened to individuals more or less affected with sea scurvy; and several medical authors and surgeons of the navy have remarked the frequent co-existence of the two diseases.*

It is very often symptomatic of derangement of the digestive organs, so much so that Scarpa, (*Scarpa*, Mallatie degli Occhi, p. 252. Pavia, 1801.) Schmucker, Richter, and several other authors, seem to consider the disease as almost entirely originating in this cause.

Some morbid condition of the brain would likewise appear to be occasionally present; for headach and vertigo, pain and watering of the eyes, &c., have been enumerated as precursory or concomitant symptoms.†

Hippocrates (Op. cit. Prædict. lib. ii. sect. ii. p. 110) and Celsus (De Medic. lib. vi. cap. vi. p. 369. Lugd. Bat. 1730) state that females, whose catamenia are regular, are not subject to attacks of this disease; but later observations sufficiently prove the general inaccuracy of this opinion. It is indeed true that the proportion of males affected is in general greater than that of females; but this arises from the circumstance that the latter are usually exempt from the same degree of hard labour in the fields, and other debilitating causes. For similar reasons young children are seldom affected by it.

Persons of different temperaments are equally liable to nyctalopia; and it is not peculiar to those who have eyes of any particular size or colour.

Nyctalopia has been attributed to various other causes, such as eating rice, sleeping in the sun, the use of poisonous vegetables, a fit of anger, (Lettres Edifiantes, loc. cit. p. 434,) &c. It appears from Haller (Disput. loc. cit. sect. xxi.) that the inhabitants of Bavaria ascribe the disease to the use of bread in which darnel is present; and this opinion is one of great antiquity; for both Virgil‡ and Ovid§ mention that "lolium" was believed to be hurtful to the sight; and Plautus‖ expressly says that it produces nyctalopia.

[In very rare cases it would seem to be a congenital affection, and capable of being transmitted from father to child. In such cases there must, of necessity, be a peculiarity of organization. M. Cunier (*Annales de la Société de Médecine de Gand*, 1840, and *Lawrence on Diseases of the Eye*, Amer. edit. p. 541, Philad. 1843,) has published the history of a family in which it appears to have been transmitted, by hereditary descent, through six generations.]

Pathology. — In order to produce distinct vision, a due proportion of light is necessary to excite the retina. The quantity required for this purpose depends much on the impressions which have been previously made on the organ. When the eye has been exposed to a strong light, a fainter illumination will not suffice to enable it to discriminate objects; while, on the other hand, vision will be painfully acute, even in a comparatively obscure light, to those who have previously been in a state approaching to entire darkness. Thus the prisoner becomes gradually enabled to perceive the objects in his cell; while the man who has been exposed to the reflection of the sun's rays from the snow is rendered for some time incapable of seeing in the less dazzling though clear light of day. From the operation of the same law, the eye, in nyctalopia, after being exposed to a long and brilliant sunshine, is not excited by the feeble light which continues after sunset, and vision entirely ceases.

When an organ is often and highly stimulated, its sensibility, it is well known, becomes impaired. The long-continued action of light accordingly produces a state of torpor or insensibility of the retina, which becomes greater in proportion to the degree of predisposition and length of time during which the exciting causes continue to operate. In the early stages of the disease, before any considerable insensibility of the retina has been induced, vision is observed to be more or less perfect in a clear light, and according to the degree of illumination. But after a lengthened attack, the increasing torpor of the retina renders it insensible to the stimulus of even a bright artificial light. While this torpid state of the organ remains, the pupil continues dilated and immovable on the approach of a light which is not of sufficient intensity to excite the retina in the degree requisite to produce vision.

Nearly the same explanation applies to that state of protracted disease in which the eye has become unable to bear the direct or reflected rays of the sun. The heat and light which occasion the insensibility of the retina, at the same time stimulate the vascular portion of the eye, so as to produce a degree of inflammation. It is in this state that the eye becomes irritable, and the pupil contracted, in order to exclude the excess of light. For while the retina preserves its natural sensibility, the contractions and expansions of the iris in most instances go on unimpaired, and the eye appears as in perfect health.

* See observations on Hemeralopia, or Night Blindness, by Andrew Simpson, surgeon, p. 31, &c. Glasgow, 1819; Blane on Diseases of Seamen, third edition, p. 485.

† "Quandoque fit propter communitatem stomachi et cerebri." *Avicenna*, Cannon. lib. iii. Fen. iii. Tract. iv. c. v. p. 561. See also *Haller*, Disput. loc. cit. sec. vi. and Lond. Med. Observ. and Enquiries, vol. i. art. xiii. p. 3. Lond. 1771.

‡ —— interque nitentia culta
Infelix lolium, et steriles dominantur avenæ.
Georgic. lib. i. vers. 153.

§ "Careant loliis oculos vitiantibus agri."
Fast. lib. i. vers. 691.

‖ "*Sceledrus.* Mirum est lolio victitare te tam vili tritico.
Palæstris. Quid jam? *Scel.* Quai lusciosus. Miles Gloriosus, p. 475. Coloniæ, 1578.

Perhaps it may be thought that, if the disease be owing to an insensibility in the eye produced by the intensity of the sun's light, the patient ought also to be blind when removed to an obscure place during the day, seeing that in both cases the stimulus of light is withdrawn from the eye. This, however, we find, is not always the case. In explanation it may, perhaps, be alleged that the action of the sun's rays, for the *whole duration* of a long day, will more effectually contribute to produce that state of the organ which constitutes the disease than when they act only for a shorter period. The inference seems to be reasonable, but it would require to be confirmed by repeated observations.

Diseases of the brain, and such other causes as induce repletion in that organ, may also produce nyctalopia by injuring the optic nerves, either at their origin or in their course, and thereby so impeding their functions as to render them incapable of transmitting the slight impressions which are made on the retina by a faint light. The last stage of this form of the disease would constitute complete amaurosis.

The well-known sympathy which exists between the stomach and the organs of vision will readily account for nyctalopia appearing so often as an attendant on disorders of that viscus.

The varied illusions and other affections of vision familiar to persons subject to dyspeptic disorders, are analogous in many respects to this disease.

A very different and almost mechanical cause has been assigned for this disease by different authors, namely, a rigid and contracted state of the pupil, whereby a sufficient quantity of light is prevented from reaching the retina. It is very evident that such a state of the pupil might occasion the disease; and it seems to be sometimes observed, as several authors have mentioned its occurrence.*

Diagnosis.—Nyctalopia can scarcely be confounded with any other disease. Yet in a complaint of such frequent occurrence in the navy and army, and which affords such facilities for carrying into effect the schemes so often devised by seamen and soldiers to enable them to evade their duty, it would be an object of importance, if any sure diagnostic symptoms could be pointed out. The present state of our knowledge does not, however, enable us to do so with any thing like precision. If contracted or dilated pupil were an invariable concomitant, this would afford a ready mode of discrimination; but these states of the pupil have been rarely observed, even in cases of long duration. As there are no direct means by which the disease can be detected,† attention must, therefore, be paid to the character, habits, and conduct of the individual, and there are few instances in which investigation and experiment will not suffice for its discovery. For some remarks on this point, see the section on *Blindness*, in the article Feigned Diseases, vol. ii. p. 136.

Prognosis.—The prognosis in nyctalopia may generally be considered favourable; and, when proper means of treatment are speedily adopted, the disease is seldom protracted. It even frequently undergoes a spontaneous cure; and the instances are rare in which it is followed by any bad effects. It has also been occasionally removed by the supervention of diarrhœa, of hemorrhage from the nose, and of abscesses and eruptions about the head and face. In two of Dr. Forbes's cases, (Edin. Med. and Surg. Journ. vol. vii. p. 419,) epiphora succeeded; and according to Mr. Bampfield, (Medico-Chirurg. Trans. loc. cit. p. 40,) lippitude and myopism are sometimes consequent upon it. This author also states that total loss of sight has been known to ensue, and refers to Bontius in support of this opinion. But from the passage in Bontius, (De Medic. Indor. lib. iv. p. 32. Parisiis, 1645,) it is somewhat doubtful if the disease which is alluded to was nyctalopia. Some authors, however, have been of opinion, that the treatment of the disease is not always successful. According to Sennertus, (Opera Omn. tom. iii. par. iii. § ii. cap. 44, p. 227. Lugduni 1656,) and Ettmuller, (Opera Omnia Comp. Colleg. Pract. lib. ii. art. 1, p. 33. Lond. 1701,) it is seldom cured, and Boerhaave (De Morb. Ocul. § 158. Gottingæ, 1750) says, "nullum remedium scio, quod hoc malum tollere possit."

Treatment.—Physicians have very generally endeavoured to adapt their mode of treating a disease to the theory which they have formed respecting its cause. This remark has been fully verified in the treatment of nyctalopia. The *humoral* pathologists, who supposed the disease to depend upon a superabundance, thickening, or congestion of the humours, had recourse to such remedies as they considered adapted for diminishing, altering, or evacuating the various humours of the body in general, and of the eyes in particular. For these purposes they recommend *attenuant diet* and bleeding, both general and local. They employed also purgatives, particularly those which they considered as suitable to diseases of the eyes —"oculis appropriata." Nor were other evacuants omitted—*sternutatoria*, *pituitaria*, and the like. Various local applications were also made use of, such as collyria, unguents, and powders, elaborately compounded with all the superfluous science, and multifarious ingredients resorted to in ancient pharmacy. Some things were recommended as remedies on principles evidently the most absurd. Thus, according to Galen and Celsus, *hieracion* was advised, because "accipitres aiunt scalpendo eam, succoque oculos tingendo, obscuritati visûs mederi; ob idque vocant hieracion." (Foresti Opera Omnia, lib. xi. obs. 38. Francof. 1634.) *Euphrasia* was thought good for the sight, from an imaginary resemblance between the spots on its petals, and the eyes. Many other equally fanciful examples might be adduced, but it may suffice to quote the following from an author of high celebrity:—"Capras negant lippire, quoniam eæ quasdam herbas edant: item dorcadas: et ob id fimum earum cera circumdatum nova luna devorare jubent. Et quoniam

* *Avicenna*, Cannon. lib. iii. Fen. 3, Tract. iv. cap. v. p. 561. Dan. *Sennert.* Opera, tom. iii. lib. i. par. iii. sect. ii. chap. xliv. p. 256. Lugd. 1656. Th. Zuinger, Pædojatreja, obs. xxv. p. 142. Basiliæ, 1721. Fel. Plateri Praxeos Medic. tom. i. cap. vi. p. 193. *Herm. Boerhaave* de Morb. Oculor. p. 159. Gattingæ, 1750. Gregorii Conspect. Med. Theor. p. 81. ed. tertia.

† "——— il n'y a point de signes qui fasse connoître cette maladie, hors le rapport du malade." Maitre-Jean, Traité des Maladies de l'Œil, 2de partie, ch. iii. p. 246, à Paris, 1740.

noctu æque quoque cernant, sanguine hircino sanari lusciosos putant, nyctalopas a Græcis dictos." (C. Plinii Secund. Natur. Hist. tom. iv. lib. xxviii. § xlvii. p. 616. Parisiis 1685.) Thus it would appear that, from the visual faculties possessed by those animals, of seeing by night as well as by day, the employment of their livers in the cure of nyctalopia took its rise. This is a remedy, the astonishing powers of which have been extolled, both in ancient and modern times, and in countries the most widely separated, with a confidence truly inexplicable. The livers of various animals were occasionally employed; but those of he-goats, bullocks, and of sheep, were preferred. Sometimes the vapour of the heated liver was applied to the eyes; at other times the viscus itself was given to the patient to eat; in both cases frequently after it had undergone the most complicated preparations, particularly with various stimulating substances. It is difficult to believe in the production of a cure by such means; and yet it would require no small degree of incredulity to set aside altogether the evidence which has been adduced in favour of these remedies.

A recent German writer has given a remarkable instance of the apparent power of this hepatic treatment of nyctalopia. As the account is altogether curious, we give the narrative at length. The author, Dr. Edward Meissner,* informs us that in a small town in Podolia, on the banks of the Bug, having a population of about 2000, some weeks before Easter, in the year 1816, he met with more than a hundred cases of nyctalopia. "I discovered this," he says, "accidentally one evening, when my surgeon, a Jew, came home hurt, having been overturned by the man who drove him, and who had suddenly become blind as the sun set. Upon inquiring why none of these people were brought to me, I was told that they very well knew how to cure themselves, and would do so as soon as they were at liberty to use the means. It was then the time of fast, when those of the Greek church use no animal food, but live chiefly on bread and grits prepared with oil. I was assured that at the same period every year a great many people were seized with nyctalopia, but that when Easter came they ate the liver of a black cock or black swine, and were cured in a few days. I had ten of these people brought to me both during the day and in the twilight, but could perceive nothing particular in their eyes, except a great immobility of pupil. In other respects they were all in perfect health, and would submit to no other kind of treatment, assuring me that they knew they would be quite free from their malady within fourteen days without my medicines. On Easter day they began to eat liver *and other animal food.* Two of those I had examined, on the third day saw as well as ever; and all were completely cured by the following Sunday."

The writer of this article has repeatedly seen a cure *apparently* produced by fumigating the eyes with the vapour of bullock's liver. The disease occurred in persons who were in some degree affected with scurvy; and various measures had been employed for its removal without benefit. The patients themselves had recourse to the bullock's liver, and declared that one or two fumigations entirely cured their complaint.

We are as yet but little acquainted with *nervous* diseases, and are too well aware of their intermitting nature to put implicit faith in the efficacy of such a remedy. The disease in these, as in many other instances, may have undergone a spontaneous cure; or it may have owed its removal to some cause which was unknown or unobserved. It must be acknowledged that the *minute* history of nyctalopia is still very imperfect.

[Besides, it is important to bear in mind, that the disease often gets well spontaneously. Dr. Wharton, of the United States Army, cured several cases by simply excluding light. The cure was effected in from 24 to 60 hours. (Lawrence, *Op. cit.* p. 540.)]

Could any remedial exhalations have proceeded from the broiling liver? or did the application of heat alone suffice to excite the torpid retina into healthy action?

In the case of the Podolians above mentioned, it is obvious that we are entitled to attribute the case as much, *at least*, to the general change in their diet, as to the specific influence of the black pig's or cock's liver.

Viewing nyctalopia in the light of a more rational pathology, it is hardly necessary to say that, to give hopes of successful treatment, regard must in all cases be had to the nature of the causes which immediately induce the disease. If it appear to proceed from fulness of blood in the head, or any affection of the brain, bleeding and other means, tending to remove such a condition, are of obvious propriety. If derangement of the digestive organs give rise to the complaint, emetics, purgatives, or such other remedies as are suitable for removing the primary disease, must be employed; and when scurvy, or any other general affection of the system prevails, the appropriate means for its removal will be adopted as the first step in the treatment; and after the chief predisposing cause has been subdued, attention will then be paid to the treatment of the local affection. Nyctalopia, however, is often unaccompanied by any specific or formal disease, and appears to depend upon general and local debility. In such cases our efforts will be directed to restore the general strength of the body, and more particularly of the eyes; and this will be most readily accomplished by avoiding the exciting causes, and by employing tonics and stimulants, both general and local. Dr. Guthrie informs us that, in a week or fourteen days, the disease "is cured by the use of a bitter tonic infusion,† although the patient continue his daily hard labour, providing he sleeps as at other seasons during the night." Although the complaint may certainly be in this way removed, yet a cure is induced still more speedily by the application of blisters to the parts immediately adjacent to the local affection. They stimulate the eyes more effectually than general remedies do; and as during their application the patient is

* Bemerkungen aus dem Taschenbuche eines Arzes wahrend einer Reise von Odessa, &c. *Halle*, 1819. See also Encyclopädisches Wörterbuch. B. V. p. 388. *Berlin*, 830.

† Made, he believes, from the "Centaurea Cyanus" of Linnæus. Edin. Med. Comment. loc. cit. p. 288.

usually allowed to go to rest at night, they constitute an important part of the remedial process in the case of seamen or others subject to night-watching. The merit of more particularly recommending blisters, and determining their efficacy in the cure of this disease, belongs to Mr. Bampfield, though the remedy is not new, as they are known to have been employed from a remote period. His words are, "A succession of blisters to the temples, of the size of a crown or a half-crown piece, applied tolerably close to the external canthus of the eye, has succeeded in every case of idiopathic hemeralopia which I have seen. Under their application, the retina appeared to regain its irritability, and sensibility to impressions from light, in the same gradual manner as it was deprived of it." (Medico-Chirurg. Transactions, loc. cit. p. 47.) In his practice, one or two applications were often sufficient to remove the complaint; but the third, fourth, or fifth generally produced a complete recovery. The instances are but few in which there was occasion for a greater number of blisters; or by keeping them open, the cure was generally completed within a fortnight. During the time in which they are applied, exposure to a bright light ought to be carefully avoided; and the patient should be allowed a sufficient time for sleep. The eyes may also be frequently bathed with cold water, or some tonic or astringent lotion.

Besides blisters, other local stimulants have been employed, particularly the vapour of ammonia; frequently, however, with indifferent success. The stimulus of electricity has been used with advantage; and, reasoning from analogy, it might be expected to prove highly beneficial, as also galvanism.

It may be proper just to notice in this place the analogous but reverse lesion of vision, termed **Hemeralopia** by those who give the name of nyctalopia to the affection of which we have been treating, in which the patient is blind during the day, but sees comparatively well at night. This disease is noticed by Hippocrates, and many other authors, both ancient and modern; but as it has never fallen under our own observation, except as a mere symptom of ocular inflammation, and as its occurrence as an idiopathic affection is, we are convinced, extremely rare, we deem it unnecessary to give any particular account of it. It may no doubt arise from such local affection of the retina of an organic though unknown kind, as to entitle it to be considered idiopathic; the relative excess of light producing here the same effect as its relative deficiency did in nyctalopia. When, however, not the immediate consequence of inflammation of the eye, it has commonly been observed as the temporary attendant of hysteria, or as a symptom of worms, or other irritation sympathetically affecting the brain generally, or the optic nerves in particular. It therefore deserves no separate consideration in this work as a distinct disease.

JAMES GRANT.

OBESITY.—This term, from the Latin obesitas, *fatness*, *corpulency*, its synonym *polysarcia*, from πόλυς, *much*, and σάρξ, *flesh*, and many others of similar import, are used to signify an excessive development of fat in the body.

Of all animal solids, fat may be named as that which may vary most in quantity without material infringement on the health. Thus we see persons in very various degrees of fatness or leanness enjoying the best health; and even the same individual, under different circumstances of diet and regimen, may become fat or lean without and corresponding change in the well-being of his body. There is, nevertheless, in most individuals, a certain degree of stoutness which best comports with that regular balance of functions which constitutes perfect and permanent health. This degree in some persons may not rise above leanness; and in these even a moderate degree of embonpoint is often a precursor or a sign of disorder; whilst in many, a fulness and rotundity of person is natural, and not only consistent with, but indicative of perfect health. This statement shows the impossibility of defining absolutely what degree of obesity is to be considered as morbid, although in its excessive degrees it is unquestionably a disease and a cause of disease. Cullen describes obesity as morbid "when it renders persons from a difficult respiration uneasy in themselves, and from the inability of exercise, unfit for discharging the duties of life to others." (First Lines, ed. by Cullen and Gregory, vol. ii. p. 208.)

Fat may be developed in excess at any period of life, but some ages are much more disposed to obesity than others; and these are infancy and maturity. Infants at the breast sometimes acquire a prodigious size from the deposition of fat. Usually this is chiefly confined to the subcutaneous tissue, and very little affects either the cavities or the interstices of the muscles; but when such children are affected with somnolency and a shortness of breath, which renders sucking difficult and movement laborious, the accumulation of fat may be supposed to be more general, and to oppress by its mass the organs of respiration, circulation, and motion. This condition is almost uniformly caused by an excess of nourishment, and is not unusually attended by a torpidity of the bowels. Fat infants are generally good-tempered; and it is difficult to say whether this be a cause or a consequence of their fatness; but a fretful disposition is generally consorted with an irritability of the secretory organs, which is opposed to any superfluous growth. The obesity of infancy generally diminishes after the second year; and it is not unusual to see the subjects of it become as thin as other children before the age of puberty. The demands of other solids of the body, which the increasing exercise at this period produces, operate against the superfluous deposition of fat; and the fuller development and greater activity of the mental faculties perhaps have a similar effect. In some of the most remarkable cases on record, however, the inordinate development of fat continued and increased regularly from infancy upwards. A German girl, who was exhibited some years ago in Paris on account of her prodigious size, at her birth weighed 13 lbs.; at six months, 42 lbs.; and 150 lbs. at four years. She showed great physical strength as well as size, for when six years old she was able to carry her mother. She ate much milky food in her childhood, and afterwards drank large quantities of tea, but did not eat more than another person. She menstruated at the age of nine years, and always

enjoyed very good health, being active and lively in her disposition. At the age of twenty she weighed 450 lbs., she then could carry in each hand a weight of 250 lbs., and could walk for an hour without requiring rest, but her breathing was short on going up stairs. Her arms measured eighteen inches (French) in circumference; and the fat formed annular rolls, as in the thighs of very fat infants. (Dict. de Médecine, art. *Polysarcie.*) Many similar cases are related in Mr. Wadd's amusing monograph on *Corpulency*, from which we extract the following.

Isaac Butterfield, born at Heightley, near Leeds, Feb. 20, 1781; in November 1782 he measured three feet in height, thirteen inches round the arm, two feet two inches round the thigh, sixteen inches across the shoulders, and weighed near one hundred weight. He died Feb. 1, 1783.

A child named Thomas Hills Everitt was publicly exhibited in London in 1780. He was not remarkably large when born, but began to increase rapidly when six weeks old, until his death, which happened at eighteen months. At eleven months he measured three feet nine inches in height; two feet six inches round the breast; three feet one inch round the loins; one foot ten inches round the thigh; fourteen inches round the leg; eleven inches and a half round the arm, and nine inches round the wrist.

Mary Tate, aged twelve years, the daughter of a publican in Cambridge, and one of twins, weighed thirteen stone; the other child died at two years. When Mary was born, she was not larger than is usual, but began to increase at five years; and at six she was publicly exhibited. Her parents were corpulent. She was attacked with a fever which prevailed at Cambridge a few months before her exhibition, and recovered without any apparent diminution of size. Mr. Wadd has collected a great number of other instances of obesity, but as they are merely named, with scarcely any particulars of their history, they are objects of curiosity rather than of medical interest. In most of the well-recorded instances of obesity in early life, there has been an uncommon development of muscular strength; and in this respect the obesity of childhood differs from that supervening in after-life.

[A girl, said to be only ten years old, called the "Ohio giantess," was lately (1844,) exhibited in Philadelphia, who was said to weigh 265 pounds; and the case of a girl is detailed, who weighed 256 pounds, when only four years old. (*Philosophical Transactions*, No. 185.) Dr. Elliotson (*Human Physiology*, Lond. 1841, part 1, 301,) saw a female child, but a year old, who weighed sixty pounds. In these cases the specific gravity of the body may be much less than that of water. It is said that there was a fat lighter-man on the Thames who had fallen overboard repeatedly, without any farther inconvenience than that of a good ducking; "since, though he knew nothing whatever of swimming, he always continued to flounder about like a firkin of butter, till he was picked up." (Fletcher, *Rudiments of Physiology*, part i. p. 71, Edinb. 1835; and the writer's *Human Physiology*, 5th edit. ii. 239: Philad. 1844.) The Lowell Advertiser, of this very date, (Sept. 1844,) states that a coloured girl, aged fourteen years, a native of Nassau, N. Y., had died in that city, weighing *five hundred* pounds.]

A remarkable case of obesity in early age was lately brought before the Royal Institution by Mr. Pettigrew. It was a boy, twelve years of age, who weighed 198 lbs. The great increase of his bulk took place after confinement, in consequence of a fracture of one of his limbs. His health is now good, and his habits, appetites, and mental development present nothing uncommon for a boy of his age. He is not deficient in activity, but he says that he cannot lift more than five stone weight.

After the completion of longitudinal growth the adipose membrane again receives the overflow of the nourishment of the body; this is less remarkable in males than in females, in whom the nutrient function is naturally more active. In both sexes, however, the irritation of the generative organs at the early epoch of maturity seems to have a remarkable effect in diminishing the plumpness of the body; and the absence of this influence in eunuchs produces the sleek smooth surface so remarkable in their bodies, in which the inequalities of bone and muscle are buried in a bed of fat. It is a familiar fact that some of the lower animals fatten much more readily after the removal of the testicles or ovaries. It is perhaps partly in connection with this circumstance, and partly from the abatement of other excitements of youth, that obesity more frequently and more decidedly shows itself as maturity advances; and it is after the fortieth or forty-fifth year that it attains its greatest degrees. The diminished mobility of both mind and body which is perceptible at this age, and the greater inveteracy of habits of living, render corpulency then a much more serious evil than in earlier life; for these circumstances, unless steadily and vigorously counteracted, will infallibly increase it in a degree that must abridge life by encroaching on the functions of various internal organs, and laying the foundation of fatal diseases. This we shall see sufficiently explained in the situations which fatty accumulations occupy at these ages. Besides the thick bed of fat in the subcutaneous tissue, and in the interstices of the muscles, the mediastinum, the pericardium, the mesentery, and the omentum, become the seats of prodigious adipose depositions. Such subjects, besides a largeness and rotundity of body and limb generally, have a protuberant abdomen, and the loose texture in the axillæ, under the chin, and about the mammæ of women, becomes in like manner distended with fat. The effect of these accumulations is mechanically to oppress the adjoining organs; hence, shortness of breathing and asthma, weak or irregular action of the heart and palpitation, an oppression and consequent disorder of the digestive apparatus, inability of movement, obstructions to a free circulation of the blood, and dropsical effusions. The cavity of the head is the only one which escapes the deposition of fat; and this exemption exposes its contents to a still greater evil. The various obstructions to the circulation, and the increased pressure to which the mass of fat throughout the body subjects it, produce a determination of blood to the head, and congestion; whence arise somnolency, torpor of the mental

and animal functions, and sometimes apoplexy and sudden death.

We have hitherto considered obesity as a simple hypertrophy, but there is reason to believe that in many cases the fatty substance encroaches on the nutrition of other structures. In very fat subjects, both in man and in the lower animals, the fibres of the muscles are often interspersed with depositions of fat, sometimes to such a degree that the latter constitutes the greater part of what once was muscle, and the remaining fibres are commonly softer and paler than is natural. All the muscles are liable to this change, and the heart among the rest; the consequence necessarily is a diminution of their contractile power. We have seen the heart thus more than half converted into fat; the adipose tissue of the base and surface having encroached on the muscular fibres, so that at the base and along a great part of the wall of the right ventricle, and at the septum of the ventricles, these fibres only formed a thin stratum irregularly terminating in the adipose tissue. Laennec describes this state of the heart, and says that "the fatter the heart is, the thinner in general are its walls; and on cutting into them the scalpel seems to reach the cavity without encountering almost any muscular substance, the columnæ carnæ appearing merely as if bound together by the internal lining membrane." (Dr. Forbes's Trans. p. 637.) He distinguishes it from fatty degeneration by the marked difference between the muscular fibre and the fat, the latter seeming rather to have superseded the fibres than to have been formed in them. The effects of this change must be unquestionably to render the action of the heart weak, and the circulation languid and inefficient; and some of the instances of the sudden death of fat persons may reasonably be ascribed to a rupture of the organ in this weakened state. M. Bertin describes a case of the rupture of a prodigiously fat heart. But the mere diminution of power in the heart, and its oppression by a load of fat, without any rupture, seem to have caused death in some cases. Dr. Brian Higgins of Dublin, the first discoverer of equivalents in chemistry, appears to have died from this cause; and there are many similar examples on record. These forms of obesity must have a tendency to increase; for as fat is deposited in and around the muscles, they will be less disposed to that habit of exercise on which their development mainly depends, whilst obesity and its causes will increase together.

Without dilating this article with cases of extraordinary obesity, we may state generally that the fat, which is computed to constitute an average of from 1-10th to 1-15th of the weight of the body in persons of ordinary degrees of stoutness, in extreme cases amounts to 4-5ths; and the absolute weight, which runs commonly from 10 to 14 stone (14 lbs.), has been known in remarkable cases of this disease to reach to from 30 to 50 stone. Mr. Lambert, of Leicester, who is always placed at the head of the list, weighed 52 stone 11 lbs. There is detailed in the twelfth volume of Corvisart's *Journal de Médecine et de Chirurgie*, an interesting account of a case of obesity by M Dupuytren, with a full description of the tissues affected and the proportion of fat in various parts of the body: an extract from this has already been given in the article Hypertrophy, and it is therefore unnecessary to repeat it here.

Obesity is sometimes partial: and it has its seat in no part more frequently than in the omentum, which has been known to increase to the weight of 20 or 30 lbs. This gives the appearance of what is vulgarly called a pot-belly. The mediastinum is likewise occasionally filled with fat without a corresponding obesity of the body; and the double chin often occurs as a partial obesity. The mammæ, abdominal paricles, and nates of women are likewise sometimes the seats of fatty enlargements; the latter are so to a ludicrous degree in the Bosjesman Hottentots.

Pathology.—Fat is an oily matter contained in minute vesicles which are agglomerated together in masses in the cellular tissue of various parts of the body. Whether there is a peculiar adipose tissue, or whether the fat is deposited in the common cellular structure, is a matter of dispute amongst anatomists. Dr. W. Hunter described the adipose tissue as distinct, and as consisting of cells which do not communicate with one another. He grounds his opinion on the following facts. The parts where fat most commonly accumulates are not those which are most subject to œdematous and emphysematous swellings, nor do the forms of parts increased by fat, and of those whose cellular tissue is distended by serum, resemble each other. Adipose accumulations do not pit on pressure, or gravitate towards the most dependent part, as anasarcous effusions do: the scrotum, so commonly the seat of the latter, is scarcely ever affected with fatty enlargement. W. Hunter's opinions have been adopted by Monro, Mascagni, Bichat, and Beclard. Haller, Wolff, Hensinger, Magendie, and Meckel deny the existence of a peculiar adipose tissue, and consider that fat is merely deposited in globules in the cellular structure. Meckel supposes the fat to be a solid, manifesting itself in globules, which make cells for themselves in the mucous tissue, in which he asserts there is naturally no cellular division or communication. A minute examination of human fat does not confirm this latter opinion, for it traces its globular form to the presence of an investing membrane, while the contained oil is liquid or solid, and the animal temperature according as elain or the stearin prevails in it, which varies in different parts of the body. We are, therefore, disposed to retain Dr. Hunter's view, which is confirmed by the distinct and characteristic appearance which the adipose substance presents when surrounded by serous infiltration of the cellular tissue.

There has been an equal discrepancy of opinion as to the place of the formation of fat. Haller and Magendie consider it as a simple exhalation from the blood. Dr. W. Hunter ranks it as a secretion elaborated by the specific tissue in which it is found; whilst Sir E. Home has framed a curious hypothesis, that it is formed from the fæcal part of the food in the colon, whence it is taken up by the blood-vessels, and deposited in different parts of the body. Almost the only argument urged in favour of this last notion is a supposed resemblance between the retention of fæces in the colon, and certain cases in which de

cayed animal matter is converted into adipocire: this resemblance is very slender and distant; and if Sir E. Home has proved that an oily matter is sometimes present in the fæces, he has failed to prove that it is either formed there, or conveyed thence into the system; whilst on the other hand there are on record cases which prove that fat may be formed and deposited in the body without any aid from the colon. Thus the subjects of artificial anus have been known to get fat, although no fæces passed through the large intestines. (See Dr. Mackeever on Laceration of the Uterus, p. 48, 1824.)

The question whether fat exists ready formed in the blood, or is only elaborated at the point in which it is deposited, is much of the same nature as that respecting other secretions, such as urea, bile, mucus, &c. Commonly none of these are detected in the blood, but under some circumstances they may each be found to exist there; and the presence of fat giving a milky aspect to the serum* is not so uncommon as to exclude the probability that it always exists, but in proportions too small to be readily appreciated unless circumstances lead to its accumulation. And we have the positive testimony of Drs. Christison and Babington, and more recently of M. Lecanu, that there is always fatty matter in the blood, according to the latter chemist, in ordinary cases amounting to from three and a half to six and a half in a thousand parts. (Journ. de Pharm. Sept. and Oct. 1831.) These facts, coupled with the well-known presence of oily matter in the chyle, remove much of the difficulty of explaining the rapid accumulation of fat in the body under some circumstances, and its still more speedy reduction in others. These changes, if not the result of simple exhalation and absorption, are obviously more nearly allied to them than they were formerly considered to be; and although the secernent power of vessels is undoubtedly concerned in the deposition of fat, we must not overlook the cohesive quality of this substance, by virtue of which it agglomerates to matter of its own kind, whilst watery liquids have but little affinity for it. Hence we can perceive why blood surcharged with fatty matter from the chyle promptly deposits it, especially where adipose substance already exists; whilst for its removal there must be an augmented energy of the absorbent function. This view, which is but an hypothetical one, would assign the chylopoietic viscera as the probable seat of the formation of fat, although there may be reason to believe that it becomes modified and perfected in its progress through the circulation.

Another conjecture has been proposed by Dr. Bostock, that fat is formed like other secretions from the blood; and its production, by removing a superfluity of hydrogen, is a means of maintaining a uniformity in the composition of the circulating mass. The kidneys are the emunctories of azote, and the lungs of carbon, whilst fat, the prevailing ingredient of which is hydrogen, may maintain the balance by carrying off the superfluous hydrogen. If this were the mode of its production, the excessive development of fat ought to be accompanied by an unusually copious secretion of urea by the kidneys, a circumstance not, as far as we know, attributed to cases of obesity.† Of the excretions, that of the liver bears the nearest analogy to fatty matter; and this fact suggests a question whether an obese diathesis may not be sometimes connected with a comparative torpidity of this viscus.

Causes.—These may, as usual, be divided into predisposing and occasional. The predisposing, as consisting in a peculiar habit or temperament of body, is frequently hereditary. At the first glance, we may be led to say that the predisposing cause is the most powerful, inasmuch as no mode of diet and regimen will succeed in making some persons fat, whilst others increase to a great size, without, in these particulars, exceeding the bounds of moderation. A more comprehensive survey, however, of the symptoms in different cases, suggests that the constitutional cause is not always of the same nature, and that therefore it has a varying share in the production of morbid obesity. A full diet, especially abounding in oily, carneous, saccharine, and farinaceous matter, will seldom fail to fatten a person naturally disposed to corpulency; and if to this, rest of body and mind be added, this effect is almost certain. Some individuals, having a strong constitution and good general health, require these to make them fat, and become so only in proportion as they indulge in them. These persons, in whom the predisposing and exciting causes may be said to be nearly balanced, constitute a large proportion of the cases of moderate obesity that are commonly met with. In them the circulation and other functions are effective and regular, the secretions free, and the bodily and mental powers little embarrassed. Their corpulency is merely an overflow of health, the deposition of fat being the outlet by which the blood-vessels deliver themselves from impending plethora, and is accompanied by an increase rather than a diminution of other solids. This form we would denominate *sthenic* obesity. A preponderance of the same predisposing cause, the hypertrophic diathesis, gives a more marked form of the disease, and constitutes the greater number of those cases of uncommon size and strength which are frequently shown about the country. When this form of obesity becomes much pronounced, by the embarrassment which it causes in the functions, it tends to pass into the second variety of the disease, which we would term *asthenic*.

In asthenic obesity, the predisposition is still

* We once saw this milky appearance of the serum very remarkable in the blood of a corpulent patient suffering under an attack of pneumonia; she had been largely bled previously.

† We cannot omit the opportunity to express here our conviction, that a more frequent and habitual attention to the state and composition of the excretions would greatly enlarge our knowledge of the pathology of diseases. The interesting study of animal chemistry has established, to a certain degree, that the great excretory organs, the liver, the lungs, and the kidneys, act as balancing forces, which keep the blood of a uniform nature; and it must, therefore, be obvious, that the inordinate or imperfect action of any of these would lead to a more or less disordered state of this fluid, which must necessarily react on the functions at large. Without advocating an absolutely humoral system of pathology, we cannot but view a disordered state of the fluids as an important link in the concatenation of diseased action, and as a main object of therapeutic efforts. For a clear insight into this subject, much patient and well-directed research is required; and had we a few more such inquirers as Dr. Prout, we might sanguinely look forward to the attainment of this point.

more strong, and probably consists of a greater number of constitutional causes. This predisposition is frequently hereditary, and is commonly allied with a leucophlegmatic temperament, a soft, languid pulse, defective excretions, and a low irritability of the body. There is in such individuals a sufficient activity of the first part of the digestive process; but a somnolent disposition, often present for some hours after meals, indicates the admixture of chyle in the circulation, and a tardiness in its assimilation. The chyle thus supplied probably abounds more in fatty particles than in albuminous globules. Until, therefore, the former are deposited from the circulating mass in the adipose membrane, the blood does not recover its natural and most healthy constitution. There is good reason to believe that naturally this adipose matter is always at the command of the absorbent functions, and that, in case of the excretions being augmented in a greater ratio than the supply of nutriment, it is taken into the circulating mass to make up for the waste. In a person of sanguine temperament, the demand on the adipose membrane equals the supply: such an individual makes blood fast, and suffers from plethora before there is any considerable increase of fat in the body. A person of spare habit, again, is liable to neither form of hypertrophy; as either the incapacity of his digestive organs, or the activity of his excretions, preclude all superfluous accumulation. In asthenic obesity, on the other hand, there is a defect in the assimilatory process by which the oily matter is made available to supply the excretions of the body; and this defect may be either in the absorbent function, or in that action by which the matters excreted are formed; but it is most probable that the same defect of tone which manifests itself in the state of the body generally, extends to both these functions. Hence asthenic obesity resembles atonic dropsy, in which it not unfrequently terminates: it occurs towards the later periods of life, and in persons whose constitutions have been weakened by various excesses. It is not unfrequently the accompaniment of chronic disease of the liver, and more rarely of the stomach; and is sometimes a symptom of a chlorotic state in young women. It is in this form of obesity that the muscles become paler, lose their substance, and are displaced by depositions of fat.

We have already stated that good living and a life of ease are the most efficient occasional causes of obesity; this is universally acknowledged; and Dr. Arbuthnot says, "you may see an army of 40,000 soldiers without a fat man; and I dare affirm that by plenty and rest, twenty out of the forty shall grow fat." The portly appearance of butchers, landlords of inns, and butlers, is obviously referable to their good living and moderate exercise.

With respect to the quality of food which is most fattening, much variety is seen; either animal or vegetable diet being capable of producing the most marked effect, if taken in sufficient quantities. Thus the negroes of the West Indies, and the Chinese slaves, sometimes acquire an enormous size during the sugar season by drinking the cane-juice; and it was remarked by Galen, that the keepers of vineyards, who live on nothing but figs and grapes, become fat. The ladies of Tunis and Tripoli are fattened, to please the tastes of their lords, with farinaceous food, and a seed called *drough*. "Among the Asiatics there is a sect of Brahmins who pride themselves on their extreme corpulency. Their diet consists of farinaceous vegetables, milk, sugar, sweetmeats, and ghee. They look upon corpulency as a proof of opulence; and many arrive at a great degree of obesity without tasting anything that has ever lived." (Wadd's Remarks, &c. p. 80.)

Malt liquor, consisting of a saccharine and feculent infusion, rendered readily digestible by the stimulant and stomachic properties of the bitter and spirit with which it is combined, is highly nutritious, and some of the most remarkable subjects of obesity have been addicted to excessive indulgence in ale or porter. The following case is related by Mr. Wadd.

"A few years ago a man of about forty years of age hired himself as a labourer in one of the most considerable ale-breweries in the city. At this time he was a personable man; stout, active, and not fatter than a moderate-sized man in high health should be. His chief occupation was to superintend the working of the new beer, and occasionally to sit up at night to watch the sweet wort; an employment not requiring either activity or labour: of course at these times he had an opportunity of tasting the liquor, of which it appears he always availed himself: besides this, he had constant access to new beer. Thus leading a quiet inactive life, in a short time he became of such an unwieldy size as to be unable to move about, and was too big to pass up the brewhouse staircase; if by any accident he fell down, he was unable to get up again without help. The integuments of his face hung down to the shoulders and breast: the fat was not confined to any particular part, but diffused over the whole of his body, arms, legs, &c. making his appearance such as to attract the attention of all who saw him. He left this service to go into the country, being a burthen to himself, and totally useless to his employers. About two years afterwards he called upon his old masters in a very different shape to that already described, being reduced in size nearly one half, and weighing little more than ten stone. The account which he gave of himself was, that as soon as he had quitted the brewhouse he went into Bedfordshire, where having soon spent the money he had earned, and being unable to work, he was brought into such a state of poverty as to be scarcely able to obtain the sustenance of life, often being a whole day without food; that he drank very little, and that was generally water. By this mode of living he began to diminish in size, so as to be able to walk about with tolerable ease. He then engaged himself to a farmer, with whom he staid a considerable time, and in the latter part of his service he was able to go through very hard labour, being sometimes in the field ploughing and following various agricultural concerns for a whole day, with no other food than a small pittance of bread and cheese. This was the history he gave of the means by which this extraordinary change was brought about. He added, his health had never been so good as it then was"

In another case, from the same writer, more of the asthenic kind, the subject, a woman who died suddenly at the age of forty-four, weighing twenty-three stone, had subsisted chiefly on vegetables and pastry, and drank large quantities of milk and water, consuming above a gallon in the course of each night. She was totally incapable of rising from her bed, and required three strong men to place her in her chair.

While these cases show that the quantity more than the quality of nutritious aliment supplies the disposition to obesity where it exists, it is at the same time certain that fat meats, butter, milk, the saccharine, the finer farinaceous, and the oily vegetable substances, with malt liquors for drink, are the most fattening kinds of food; and varied combinations of these are more effectual to this end, inasmuch as they are more inviting to the appetite, and more manageable, even in large quantities, by the digestive organs, than simple substances, however nutritious.

Besides food, there are other circumstances which contribute greatly to the production of obesity. Absolute rest is less powerful than some kinds of moderate exercise, as it can seldom be indulged in without such an interruption to health as would prevent the fattening process. The obesity which ensues on absolute rest is generally more of the asthenic kind. There is no mode of living that seems to dispose more to obesity than that of a regularly employed coachman. The gentle exercise and free exposure to the open air which their occupation entails upon them, gives a good appetite and easy digestion; and while they seldom fail to indulge these, they are rarely called upon for those exertions of the lower extremities, or of the whole frame, that reduce the body by a general increase of the excretions.

Mental repose, both of the powers and passions, has been considered a great promoter of obesity. We think, however, that the sluggish minds and easy tempers of fat people are as often the effect of the phlegmatic constitution which disposes to obesity, as a cause of this state. They are frequently accompaniments of asthenic obesity; and a somnolent inactivity of the mind, as of the body, may be the effect of an advanced state of any kind of corpulency: but the case of David Hume, the historian, who became very fat during his intellectual labours, and that of Napoleon under the most powerful excitements of passion and mental energy, and many others which we could cite, prove that fat and stupidity are not such inseparable companions as Lord Chesterfield represented them.

The national differences which are observable in the disposition to obesity are probably referable more to the temperament, diet, and habits of the people, than to any peculiarities in climate. It has been stated that obesity sometimes commences after convalescence from a fever, or after a course of mercury; and all that can be said in explanation is, that these influences seem to produce in various respects a change in the constitutional diathesis, as other morbid tendencies, not pre-existent, are occasionally developed by the same causes. We have known a partial accumulation of fat succeed to repeated attacks of erysipelas in he part; this bears more analogy to common nypertrophy.

[In the view of Liebig, (*Animal Chemistry*, Webster's edit. p. 85, Cambridge, Mass. 1842,) the abnormous condition, which causes the undue deposition of fat in the animal body, depends on a disproportion between the quantity of carbon in the food, and that of the oxygen absorbed by the skin and lungs. In the normal condition, the quantity of carbon given out is exactly equal to that which is taken in with the food, and the body experiences no increase of weight from the accumulation of substances containing much carbon and no azote; but if the supply of highly carbonized food be increased, the normal state can only be preserved by exercise and labour, through which the waste of the body is increased, and the supply of oxygen accumulated in the same proportion. The production of fat, Liebig maintains, is always a consequence of a deficient supply of oxygen, for oxygen is absolutely indispensable for the dissipation of the excess of carbon in the food. "This excess of carbon, deposited in the form of fat, is never seen in the Bedouin or in the Arab of the desert, who exhibits to the traveller with pride his lean, muscular, sinewy limbs, altogether free from fat; but in prisons and jails it appears as a puffiness in the inmates, fed, as they are, on a poor scanty diet; it appears in the sedentary females of oriental countries; and finally it is produced under the well-known conditions of the fattening of domestic animals."

Whether the view of Liebig be admitted or not, it is certain that the circumstances which favour obesity are absence of activity and of excitement of all kinds.]

Treatment.—It is sufficiently obvious from all that has preceded, that diet and regimen constitute the most effectual means of cure in this disease; and Dr. Radcliffe's pithy motto, "to keep the eyes open and the mouth shut," promises more benefit than any medicinal prescription. The following cases, which are only specimens out of a very long list, will illustrate the efficacy and safety of this plan, as well as its modes of application, better than mere general rules.

Mr. Wood (the miller of Billericay, whose case is related by Sir George Baker in the Medical Transactions of the College of Physicians,) at his forty-fourth year had attained such a size that he was a burthen to himself, and incapable of performing common acts of exertion. At the suggestion of the rector of his parish, he resolved to follow the example of Cornaro in a life of abstemiousness. He had been accustomed to indulge in large quantities of ale and animal food, with an unsparing proportion of fat. These he left off gradually, and substituted puddings of flour and milk; and at last, one made of sea-biscuit, eaten twice only in the day, was his only food. He first substituted water for beer, but afterwards brought himself to do without any liquid. By this plan he reduced himself ten or eleven stone, and was "metamorphosed from a monster to a person of moderate size; from the condition of an unhealthy decrepid old man to perfect health and the vigour and activity of youth."

A country tradesman, aged about thirty, of a short stature, and naturally of a fresh sanguine complexion and very fat, applied to Dr. Fothergill for assistance. He complained of perpetual drow-

siness and inactivity; his countenance was almost livid, and such a degree of somnolency attended him that he could scarcely keep awake whilst he described his situation. Dr. Fothergill advised him immediately to quit all animal food, to live solely on vegetables and every thing prepared from them, allowed him a glass of wine and a little beer occasionally, but chiefly confined him to water. He pursued this plan very scrupulously, lost his redundant fat, and grew as active as usual in about six months. Dr. Fothergill recommended a perseverance for a few months longer, then to allow himself light animal food once or twice a week, and gradually to fall into his usual way of living. He grew well, and continued so.

A young unmarried woman, about twenty-three years of age, of low stature and very fat, consulted the same physician, on account of great difficulty of breathing, somnolency, and incapacity for any exercise. It was a hardship to her to be obliged to go up stairs, and at last to cross the floor of her apartment. It seemed to Dr. Fothergill that mere obesity was her principal malady; indeed she had no other complaint but such as might be accounted for from this supposition. She was ordered to pursue a vegetable diet, and in the summer to drink the waters at Scarborough. She conformed to these directions, became more agile, less sleepy, less averse to exercise: she walked up stairs at Scarborough from the Spa, a task of no little difficulty to people much less encumbered. A continuance of the same diet was urged: she was dissuaded from it by her friends, and died of fat in the twenty-seventh year of her age. (Med. Obs. and Inq.)

A gentleman of great respectability in the mercantile world, who weighed thirty-two stone nine pounds, put himself upon a strict diet of four ounces of animal food, six ounces of bread, and two pounds of liquid, in twenty-four hours. In one week he lost thirty pounds weight, and in six months he was diminished the astonishing quantity of one hundred and thirty-four pounds. His health and spirits were much improved; and considering his remaining size of twenty-three stone, he was very active. (Wadd, p. 82.)

Mr. W., of Whitehaven, at about thirty years of age weighed twenty-three stone, ate and drank with great freedom, and in great abundance. He became at length so lethargic that he frequently fell asleep in the act of eating, even in company. By the advice of Dr. Gregory of Edinburgh, he took a great deal of exercise, lived sparingly, and slept little. The prescribed diet was brown bread and tea; but the patient, finding it necessary to fill his stomach, ate a great quantity of apples: and to enable him to take the necessary exercise, he found a pint of port or sherry per diem indispensable. He retired to rest at eleven, and rose between four and five o'clock. His only medicine was three brisk purges a week. By this system he reduced himself to fifteen stone, with great improvement to his health. (Wadd, p. 85.)

A baker, living in Pye-corner, attained the weight of thirty-four stone, and could not move out of his chair for many years. He would frequently eat a small shoulder of mutton five pounds weight, and proportionably of other things, and drink a gallon of good beer. He was moreover of a costive habit, and required four times the strength of an ordinary purgative to operate on him. He with great resolution persisted for one year in living on water-gruel and brown bread, and lost nearly two hundred pounds of his bulk. (Wadd, p. 102.)

These cases sufficiently prove the efficacy of a plan of abstinence; but there are cases in which its application will require some caution and modification. It is especially in relation to the treatment that we wish to preserve the distinction between the sthenic and asthenic varieties of obesity. The former will bear measures that would be insufficient or unsafe in the latter. Thus a sudden and total prohibition of animal food and fermented liquors would lower the circulation, already too languid in the asthenic form; and by retarding the absorptive process, and weakening the locomotive powers too much for exercise, change the disease from obesity to a cachectic dropsy. Experience has shown, on the other hand, that persons of robust constitution, when affected with obesity, may with impunity even abruptly reduce the quantity and quality of their aliment, and with the most beneficial results. The inexpediency of laying down any absolute plan for the treatment of obesity will, therefore, be obvious; and the necessary distinctions may very well be comprehended in the two kinds into which we divide them.

Treatment of sthenic obesity.—The circulation is here supposed to be vigorous, the digestion good, and the absolute strength not impaired; although the activity be greatly diminished by the inroads of the disease. The indications here are, therefore, 1. to remove the accumulated fat; 2. to exclude from the system all material of nourishment beyond what is necessary to supply the demands of the excretions; 3. to ensure that the nourishment that is taken in be applied only in this way. All these indications may be fulfilled by diet and exercise.

The food should be very moderate in quantity; this is the most important point, and the next is that it be not too nutritious in quality. The breakfast may consist of tea and brown bread (not more than four or five ounces) without butter. If there should be a feeling of great exhaustion in consequence of the scantiness of this allowance, a dried herring or a hard-boiled egg may be added. The brown bread which is made by several bakers in London, containing the finer particles of bran and a proportion of rye-flour, is to be preferred, as it is less nutritious, and acts on the bowels more than any kind of bread or biscuit. As long as active exercise can be persisted in, we do not think it advisable to exclude entirely the use of animal food. A few (three or four) ounces of lean meat, white fish, poultry, or game, with a proportionably sparing quantity of the less nourishing vegetables, such as greens, turnips, pulse, sorrel, chiccory, &c. with two or three glasses of white wine if required, may constitute the dinner. If the absence of the habitual quantity produce a painful sensation in the stomach, the only supplement that may be added is a cucumber or salad without oil or egg in the dressing; or, if preferred, an orange or two, an apple, or a few gooseberries, strawberries, or currants, with little or no sugar

may be taken to allay the cravings of a dissatisfied appetite. Although it is desirable not to tempt by variety, nor to allow more than three articles for the principal meal, yet the varying of these from day to day keeps the stomach in tone, and reconciles the patient somewhat to the difficult task of great moderation. Very little liquid should be taken during dinner, and the liquid meal after it should be restricted to a single cup of tea or coffee with little or no sugar or milk; for we are convinced that copious libations of any kind at this time hurry the chyle into the circulation in an imperfectly assimilated state, and, therefore, more abounding in oily particles. There should be no solid food taken after dinner; or if the appetite be very craving, an orange, a roasted apple, or a cup of thin gruel with a little lemon-juice in it, taken half-an-hour before bed-time, should suffice; these contain but little nourishment, and tend to keep the bowels in a soluble state.

The habit of active exercise is quite as necessary as abstinence, and it requires as much resolution to observe it. In advanced stages of obesity, horse-exercise is almost the only kind that can be pursued, the legs being unequal to support their burthen for a length of time sufficient to be useful; but the patient must submit to the roughest paces of his sturdiest horse. When walking can be accomplished, the legs must not be spared: this is the best exercise to reduce bulk, both because it can be more readily resorted to and longer persevered in, and because, being most general, it excites the excretions more than other kinds. It may, however, with advantage be varied with digging, rowing, dumb-bell exercise, and various other gymnastic pursuits. At least two hours out of the twenty-four should be imperatively devoted to the energetic practice of some of these modes of exercise; and the more beyond this, the speedier will be the reduction of bulk. Corpulent persons ought to limit their period of sleep as much as possible, by rising early to take a walk or some exercise before breakfast, and the disposition which they frequently have to sleep during the day and after meals should never be indulged in.

A very salutary kind of exercise, and one that may conveniently be allotted for the fasting task, is vigorous friction of the limbs and body by the hands or with a flesh-brush; and this may be advantageously preceded by the shower-bath, or copious cold ablution. These means promote the action of the absorbents, and improve the tone of the cutaneous circulation.

There is little need of medicines in the slighter degrees of sthenic obesity; for the functions are generally pretty well performed. If the bowels require aid, and the dietetic means before recommended fail, a black draught or a colocynth pill occasionally will suffice. But in more advanced states purgatives may be indicated as depletories, especially if there be also determination to or congestion of blood in the head; in this case calomel and jalap, alternated with salts and senna, or the compound gamboge pill, will be required twice or three times a week. It has been thought useful in some cases to diminish the appetite for food by squill, ipecacuanha, and other nauseating medicines we do not recommend this generally, as nausea is a weakening influence, and renders exercise a painful effort; but there may be cases in which the natural appetite cannot be stinted without real suffering: in these, small doses of ipecacuanha, or, what is better, dissolving in the mouth a camphor lozenge or smoking a cigar, may occasionally be resorted to, to relieve this craving sensation. As to vinegar and other acids, which formerly were reputed remedies in obesity, we cannot but follow Cullen in condemning their use, since their effect is only in proportion as they counteract the digestive process, and the risk which they entail, of exciting chronic diseases of the stomach and bowels, far outweighs their thinning powers, which often fail when unsupported by diet and exercise. Soap and alkalies were highly recommended by Dr. Flemyng, (Discourse on Corpulency, London, 1780;) and as they have a certain chemical affinity for fat, and increase the secretion of urine, they seem to promise advantage: but the illustration of their efficacy in the case described by Dr. Flemyng falls greatly before the numerous examples of cure by abstinence and exercise. As adjuncts to these means, alkalies may prove beneficial, and especially in the common complication of gout with obesity, ten to twenty grains of soap in the form of pills, *m.*xv to xxx of the liquor potassæ, or four to eight grains of the subcarbonated alkalies in ℥i of camphor mixture, may be given twice or thrice in the day.

Treatment of asthenic obesity.—The indications here are to increase the activity of the functions of circulation and absorption, and to improve the tone of the digestive and locomotive organs.

Abstinence is an important agent in this as well as in the other kind of obesity, and the outline of the diet before sketched may be followed here; but the reduction of the quantity of the food must be made more gradually, and the quality with greater care adapted to the powers of the digestive organs. Thus, if there be a disposition to gastric irritation, the milder and more farinaceous articles are to be chosen, their quantity being still limited; but if a nervous dyspepsia accompany the obesity, which is the commoner case, such kinds of animal food which have been already recommended, together with a little spiced rice and a small quantity of white wine, once a day, are more eligible; no salads or supplements of any kind being allowed, and the breakfast being restricted to biscuit or dry toast, with tea or coffee. The quantity of these articles must be gradually but steadily diminished as far as the strength and general health of the patient will permit.

The defect in muscular power which commonly attends asthenic obesity considerably limits the means of exercise. Horse exercise is still generally practicable; and the oftener it is resorted to, the better. An important substitute may be obtained in friction of the body and limbs; this is a powerful mean of promoting the absorption of superfluous matter, and of giving vigour to the sanguineous circulation of the surface. Where there is a relaxed state of the body and an easily perspirable skin, friction should be preceded by the salt-water plunge or shower-bath; but where the skin is harsh, with a deficient reactive power

of the superficial vessels, it may with the greatest advantage be combined with the vapour-bath in the manner of Indian shampooing, which is very effective in giving laxity and freedom to the cutaneous circulation. In proportion as the muscular strength is restored, it must be engaged in other kinds of exercise to the utmost of its power; and in the ratio of its increase will be almost infallibly the diminution of the torpid bulk of the body and its accompanying disorder.

As there is often considerable derangement of the organic functions, the aid of medicines is frequently required in asthenic obesity. Those most needed are those which increase the excretions, and improve the tone of the animal fibre; and by a judicious administration of such evacuants and tonics much good may be effected. If there be a deficiency in their action, the bowels must be moved; but strong cathartics are not eligible, as they disorder the digestive function, already weak, and weaken the whole frame. In common constipation, or torpidity of the whole canal, aloes in the dose of three to five grains, with a grain of sulphate of iron, twice a day, is exceedingly well adapted to fat phlegmatic subjects with languid circulation. If the colour of the evacuations indicate a defective secretion of bile, a very common symptom in this form of obesity, calomel or blue pill must be occasionally combined with these medicines; and if there be such a torpidity of the absorbent function as to cause œdema, pitting, on pressure, in the fat of the legs and feet, two or three grains of gamboge may properly be added. Great advantage may in some cases of the same kind be derived from a course of a saline chalybeate water, as that of Cheltenham.

Of tonics, the alkaline preparations of iron are the most eligible, as they seem to facilitate the conversion of chyle into blood, and promote the secretion of urine, without increasing the appetite for food. The mistura ferri composita, and the tinctura ferri ammoniata are the most convenient preparations; and an attenuant and diuretic effect may also sometimes be usefully obtained by joining with them a little carbonated alkali and nitre. In no cases is this treatment more beneficial than in the obesity which occasionally accompanies defective menstruation in females; and whether this disorder be a cause or only a concomitant, it is highly important that the periodic evacuation be restored to its normal proportion.

Analogy suggests that considerable benefit might be obtained from the use of iodine, in its known sorbefacient capacity, in the asthenic forms of obesity; but we are not authorized by direct experience to recommend it. Where other complaints, such as dyspepsia, dropsy, &c., are complicated with obesity, they must be treated in the usual way. Obesity may, however, furnish a reason for modifying our practice when the subjects of it are attacked with other diseases. Fat persons do not generally bear bleeding well; purging suits them better: but they are often more readily lowered by any evacuation than their appearance would lead us to expect.

The period during which it is necessary to pursue the treatment recommended above can only be determined by the effect produced. It may be useful and satisfactory to the patient to put to the test of the balance the beneficial operation of his plan; but a restored activity, and the removal of the discomforts of obesity, give a surer criterion of his improvement; if these are accomplished, although he should still retain some largeness of bulk, there is no longer reason to consider it a disease. The return to a more generous method of living, should, however, be made very gradually, and with circumspection; and nothing should deter the individual from pursuing those habits of active exercise that have mainly contributed to free him from his burthen.

C. J. B. Williams.

[OBSERVING, METHOD OF. See Statistics, Medical.]

ŒDEMA, (οἴδημα, from οἰδέω, *to swell.*)—This term properly signifies a swelling of any kind, but is now confined to a swelling of a dropsical nature, situated in the cellular tissue. When the œdema is developed under the skin, it appears in the form of a tumour, which retains the impression of a finger, or any other body that has been applied with a slight degree of force to the surface. It has usually been regarded as a species of anasarca; and unquestionably it has much analogy with this affection. In the present article, however, we shall confine ourselves to the consideration of those œdematous affections which are not connected with a general dropsical diathesis, and which may exist for an indefinite length of time without extending beyond the original site.

Œdema appears under very different circumstances; and we are inclined to believe that, at different times, the nature of the effusion into the cellular membrane is different; the external appearance certainly is so. We are not, however, able to prove that such a difference does exist; and we shall therefore content ourselves with stating the different circumstances under which a swelling, having the character we have assigned to œdema, may happen, and the variation of treatment which such differences demand.

Œdema exists in the commencement of phlegmonous inflammation through the whole extent of the affected part; and throughout the progress of inflammation, it occupies the extreme boundaries of the diseased part in a greater or less degree. In some instances, in consequence of the nature of the affected parts, the inflammation does not pass beyond the œdematous stage before it proves fatal. Such appears to be the case in the disease to which the term *œdema glottidis* has been assigned, the cellular membrane of the glottis being the seat of a serous infiltration, which gradually closes the rima glottidis, and destroys the patient by suffocation. [See Laryngitis.] In pneumonia, also, portions of the lungs are found in the œdematous stage, the similarity of which to anasarcous effusion has been remarked by Laennec. More commonly, however, the inflammation proceeds to induration and suppuration, at least of the centre, and the œdema is found only in the circumference. M. Gendrin has given an account of the pathological state of the cellular tissue in this, which he terms an active œdema. He has derived his information from observing the processes set up in the cellular tissue in the neighbourhood of a wound.

The cellular membrane close to the wound is hard to the touch; its areolæ are infiltrated with a reddish, opaque, and gelatinous matter, and pressure gives issue to a reddish, opaque, and mucus-like serum. Beyond the inflammatory redness, there exists during life a serous infiltration which is rather elastic; and this infiltration is greater in proportion to the natural relaxation of the cellular tissue, and the inferior situation of the part. After death the œdema increases, but the elasticity diminishes. The œdema extends into the intermuscular cellular tissue, and the vessels of the part are evidently enlarged.

Of the treatment of this kind of œdema we need say no more than that it is that which is appropriate to inflammation, of which indeed it is only a stage. (See INFLAMMATION.)

The affection which has been termed "skin-bound," and which occurs in infants, is also a variety of œdema; but as Dr. Carswell has given an excellent account of it under the head INDURATION, we shall refer the reader to that article for information respecting it.

Œdema is a common consequence of rheumatism, particularly of that form which is called *arthritis rheumatica*. It may either be the remains of the active inflammation of the joints, or it may from the first appear as simple œdema. It may occur in the knees and ankles, but the most common situation is the back of the hands. It forms a cold, thick, puffy swelling, and generally white, and it is sometimes, but not always, rather tender. It is frequently the seat of dull aching pain, and the patient can make very little use of the limb. The fingers are stiff, and the hand cannot be closed. When the affection is recent, fomentations frequently repeated, and continued for half an hour at a time, will sometimes remove it very quickly, and the patient is cured as it were by a charm. More commonly fomentations are useless, as also are local warm and vapour baths; they do not even afford a temporary relief. Stimulating mercurial liniments are more useful, and generally succeed in removing the œdema in the course of a month. Dr. Elliotson appears to have employed the hydriodate of potash, but we have ourselves had no experience of it in these cases. When, however, the mercurial liniment fails, as sometimes it will, the preparation in question may make a good substitute. Its property of increasing absorption certainly points it out as a probable remedy. Occasionally a certain degree of œdema will remain during life, the patient having at the same time a tolerably free use of the limb.

While the treatment is thus directed to the local affection, the state of the general health must not be neglected. Few diseases, perhaps, are more manifestly attended with disorder of the digestive functions than rheumatism, and this disorder is not unfrequently aggravated by the remedies which are employed in the acute stage. Unless, however, when this stage is past, immediate attention be paid to the state of the digestive organs, the disease, even in its acute form, is very liable to return. The treatment of rheumatism becomes, therefore, the treatment of dyspepsia, and only by success in relieving this latter affection can we hope permanently to relieve the former. (See RHEUMATISM.)

Œdema is one of the most common attendants upon amenorrhœa. Amenorrhœa itself depends upon two opposite states of the system, a state of plethora, and a state of debility and exhaustion. In both of these œdema may exist. In the former, or the plethoric state, together with the common symptoms of plethora, there is usually much pain in the lower extremities, particularly in the lower part of the leg and round the ankles; and this pain is worse towards night, at which time also the œdema is much more considerable than in the morning. Upon examining the legs, the parts corresponding to the pain are usually cold to the touch, hard, and of a purplish colour; and this colour varies from a very light tint to an actual livid hue. It sometimes resembles purpura so far as the colour is concerned, but there is evidently no extravasation. At other times real purpura exists, and many petechial spots are present. The œdema is usually in these cases very firm, not readily yielding to the finger, and the impression is very quickly effaced. Frequently there is considerable tenderness in the course of the femoral vein, and the most common site of this tenderness is just before the vein pierces the tendon of the triceps to pass into the ham. This variety occurs in girls of a florid appearance and plethoric habit, and the usual period of its occurrence is between eighteen and twenty-five years of age. The tenderness of the vein, which probably depends upon some inflammation of the vessel, is not, however, peculiar to this diathesis, nor to this period of life. It frequently occurs in that condition which is neither very evidently plethoric nor feeble, and which equally resists an extreme mode of treatment, whether depleting or tonic. The countenance of these individuals is sallow and unhealthy, but does not exhibit that fair and pellucid appearance which distinguishes those who are the subjects of œdema in consequence of exhaustion.

The individuals last mentioned exhibit the common symptoms of amenorrhœa from debility, the quick, rolling, and easily compressible pulse, the palpitation of the heart, excessive nervousness, &c.; and the œdema of the lower extremities is both more considerable than in the former varieties, and much softer. It yields readily to the fingers, and retains their impression for some time. In some persons the œdema is so great that the swollen part overhangs the shoe excessively towards evening; and though it disappears during the night, when the patient is in bed, it returns in two or three hours after rising, gradually increasing till evening, when, from the weight and stiffness of the limbs, the patient is compelled to place them in the horizontal position, the only position in which she can obtain ease.

Œdema occurs also in women at that period which is known as *the change of life*, and is in this case, so far as our experience extends, always dependent upon a plethoric state of the system. It varies from the œdema which we have described as occurring in young persons of a florid complexion, by the absence of the livid colour, and by the swellings being much less firm and resisting.

The description above given of the different circumstances under which œdema occurs, sufficiently points out the proper mode of treatment.

In the first, or plethoric variety, not only must the general remedies be employed, as bleeding and purging, but if there be any tenderness in the course of the femoral vein, leeches should be applied to the tender part, and they should be repeated again and again, so long as any tenderness remains.

The second or middle variety requires a mixed treatment, as we have already indicated; leeches, if any tenderness is present in the course of the femoral vein, and alternate tonic and depleting remedies as the symptoms vary.

The œdema in the third variety, in which the system is suffering from exhaustion, is most benefited by the exhibition of steel; but for a more complete direction for treating these cases we refer to the article Amenorrhœa, of which disease œdema is usually one symptom.

When œdema occurs at the change of life, there are so many symptoms which intimate a plethoric state, that there can be no hesitation in recurring to depletory measures, both bleeding and purging; and as the œdema is very liable to return, till the catamenia are entirely suspended, the repetition of these remedies will be required as often as this happens.

Old persons are frequently subject to œdema of the lower extremities, and which, as their debility increases, extends higher and higher towards the trunk, yet seldom assumes the general phenomena of dropsy, there being neither a decrease in the flow of urine, nor any other inconvenience experienced excepting what is the consequence of the weight and stiffness of the limbs. Sometimes it seems to become at length connected with a dropsical diathesis, and after many years have elapsed, during which this œdema has remained stationary, ascites and general anasarca ensue.

So long as the disease remains merely in the state of œdema, nothing more is required than to support the integuments by means of a laced stocking or bandages; when, however, dropsy supervenes, it must be treated upon the principles which have been laid down in the article Dropsy.

Excessive fatigue is also a cause of œdema. Soldiers, after long marches, are subject to swellings of the ankles, and the œdematous state of the legs of horses after over-work is well known to horse-keepers, who are also aware that it is merely a state of debility; hence they bandage the legs of such horses in the stables, that the cellular tissue may have an opportunity of recovering its tone.

Œdema will also be caused by any thing which obstructs the circulation of the blood through the venous system; hence it is common in the latter months of pregnancy, from the pressure of the uterus upon the iliac veins. Ligatures also have a similar effect. The presence of œdema in the arm in cancer of the breast is probably to be accounted for on the same principle. It seldom happens till the disease has made considerable progress, and in the cases which have fallen under our notice, the axillary glands have been much affected. In our experience this œdema is much more common after the removal of the breast, and upon the recurrence of the disease, than in those cases in which no operation has been performed.

These appear to be the principal forms under which œdema may appear. How far this is an affection really different from anasarca may certainly be questioned; there is, however, in all the cases we have referred to, this peculiarity, that the affection is entirely local; that it by no means necessarily leads to dropsy; and that life may terminate without any apparent progress being made in converting it from a local to a general affection of the system.

John Darwall.

OPHTHALMIA. Under this head it is proposed to consider inflammation of the conjunctiva only, although, strictly speaking, the term is more applicable to inflammation of the eye itself.* The universal use of the term to designate inflammation of this membrane has probably arisen from this being the most frequent and obvious inflammatory affection of the organ. In approaching the consideration of this subject the student should first pause to ascertain whether his knowledge of the structure and functions of the conjunctiva enables him to announce the changes reasonably to be expected from inflammation of its texture, and afterwards should determine whether observation justifies his anticipations. The conjunctiva being a modification of the common tegumentary membrane, intermediate between the skin and mucous membrane, the changes produced by inflammation are of the same character as those induced by the same cause in these two structures. These changes are, increased vascularity, tumefaction, pain and altered secretion. The increased vascularity is characteristic: when the inflammation is slight, the enlarged vessels present the appearance of a distinct red net-work spread over the white sclerotic when more intense, the appearance of distinct vessels is lost, and the surface assumes a uniform deep red colour. The tumefaction is inconsiderable unless the inflammation be very severe, in which case the vessels become enormously distended with blood, and the subjacent and surrounding cellular membrane loaded with serum, constituting the appearance technically denominated *chemosis* on the globe of the eye, or producing a most distressing prominence of the lids. The pain is uniformly at first such as is produced by the presence of a grain of sand beneath the eyelid, but it subsequently is accompanied by a sensation of heat, producing the same description of distress as arises from a scald. The intense aching pain experienced in violent inflammation arises from the globe of the eye becoming involved in the disease. The conjunctiva being lubricated by a fluid derived from a source different from its own surface—the lachrymal gland—the first alteration in the nature or quantity of the secretion from the surface cannot be ascertained. The alteration, however, becomes speedily obvious, and is as characteristic of the disease as the other changes enumerated, purulent matter in considerable quantity being poured out. It must not, however, be assumed that the secretion of purulent matter is a necessary consequence of conjunctival inflammation; instances of the contrary will presently be adduced.

Inflammation of the conjunctiva presents the distinct characters above enumerated, because it is

*[At the termination of this article, inflammation of other parts of the eye has been added.]

inflammation of a structure of equally distinct anatomical character, but it is so completely modified by circumstances, that few other inflammatory diseases appear in so many different specific forms. The inflamination of this membrane is either circumscribed in the form of pustule, or diffused, as in the different varieties of purulent ophthalmia. Either or both of these are again modified by the presence of other diseases, and hence gonorrhœal, variolous, and other distinct species.

Inflammations of the conjunctiva may, therefore, be divided into *pustular* and *diffused;* the *pustular* into common pustular and variolous, and the *diffused* into catarrhal, severe purulent, gonorrhœal, and the purulent of infants. The grounds upon which these specific distinctions are established will be stated as each is submitted to inquiry.

While considering the nature of conjunctival inflammation in general, it is expedient to consider also the principles which are to guide us in the treatment of that inflammation. The resources available for the removal of inflammation in other structures are equally available in this. The activity of the circulation is to be diminished by general and local bloodletting—the contents of the stomach and bowels removed by emetics and purgatives—the condition of the system which nauseating medicines produce is to be induced — inflammation in the vicinity, or counter-irritation as it is called, is to be excited by blistering—the temperature of the inflamed part is to be lowered by cold applications — or the condition, whatever it may be, which warm moisture causes, should be encouraged by warm fomentations. In conjunctival, more than in any other form of inflammation, the practitioner has had recourse to the immediate application to the part of those remedies to which astringent, sedative, or irritating properties are attributed, and in considering their application to each form of disease, their comparative value will be submitted to inquiry. Particular circumstances may demand additional remedies or peculiar management — the inconvenience arising from accumulation of purulent discharge is to be avoided—the gumming together of the lips obviated—the vessels of the surface may require to be opened by scarification, or the serum of *chemosis* discharged by puncture. It may be necessary to produce the peculiar constitutional effects of mercury—to encourage the secretions of the skin, intestines, or liver—to restore the flow of milk from the breasts — to regulate the functions of the uterus—or to reproduce suppressed discharge of blood from piles. The consideration of conjunctival inflamination in detail will prove the importance of paying the most careful attention to the differences of constitution presented by different individuals, in order to substitute tonic medicines, and invigorating diet and regimen, for a system of depletion and abstinence. It is obvious that each specific form of this disease will require a corresponding variation in the application of these principles, and that the treatment must be modified with every modification of the symptoms induced by circumstances.

In studying the progress and treatment of conjunctival inflammation, the practitioner should never lose sight of the marked and important distinction to be drawn between the inflammation and its consequences. Hitherto this distinction has been so far made as to form a division of the disease into the acute and chronic stages, but it is worth considering whether the condition which is called the chronic stage should be considered analogous to that which exists during the inflammatory or acute stage. The alteration in the treatment to be adopted when the disease assumes the chronic form, and which is carefully inculcated by every practical writer, proves that those symptoms which are to be subdued by depletion and other similar means have disappeared. It is true that the increased vascularity, augmented and altered secretion, and even painful sensation still exist, but in a very different degree, and of very different character. The tense, tumid, glazed chemosis subsides, and is succeeded by a soft, pulpy, villous vascularity ; the secretion from the surface is profuse, and its purulent nature more remarkable, and the painful sensation is mitigated and unaccompanied by the scalding which characterizes the distress of the inflammatory period. The eye is not injured or destroyed by conjunctival inflammation unless the inflammation extend to the other textures, producing sloughing of the cornea, or suppuration of the eyeball; or unless it produce the altered or disorganized state of the membrane which leads to vascularity or opacity of the conjunctiva covering the cornea, or granular condition of the lining of the lids.

1. Mild Inflammation of the Conjunctiva. — That there is a form of conjunctival inflammation entitled to the above appellation, which presents a specific character perfectly distinct from every other, there can be no doubt. It is rather vaguely defined by authors under the title of catarrhal ophthalmia, but does not appear to be considered so completely different from the severer purulent ophthalmia as its history, at least according to the writer's experience of the disease, in Ireland, warrants. It is distinguished, as the title implies, by the comparative mildness of its symptoms, the vascularity never passing into true chemosis, or inducing sloughing of the cornea; the pain not being so severe, and the purulent discharge being much less copious. It occurs in spring and autumn, is epidemic or endemic, and, whether contagious or not, attacks several individuals in the same family. It affects young persons more frequently than adults, and sometimes seizes a great number of children in schools or other institutions where they are collected. The following is the history of the disease: The patient experiences a sensation of itching, with slight uneasiness, as if a mote or eye-lash had passed beneath the lid, which is greatly aggravated by the efforts made to remove it by rubbing or handling the eye. If the organ be now examined, nothing more can be discovered than an increase of vascularity, with a copious flow of tears. Next day all the characteristic symptoms may be recognised. The conjunctiva lining the lids, especially the lower, has acquired a uniform deep red appearance, and that covering the sclerotic, presents an equal vascular network, permitting the white structure of the former membrane to appear in the meshes or areolæ; the vessels not crowding together so as to produce the deep general redness

of the chemosis of severe ophthalmia. This vascularity is well represented in Mr. Wardrop's work on the Morbid Anatomy of the Eye, which contains more well-drawn and faithful representations of diseases of this organ than any other accessible to the student. There can be no difficulty in distinguishing this characteristic vascularity from the equally characteristic vascularity of the sclerotic in internal inflammation of the eye. The high degree of vascularity, with prominence of the membrane from effusion of serum beneath it, constituting the appearance denominated chemosis, never perhaps exists in mild purulent conjunctival inflammation, and therefore, when it does occur, must be considered evidence of the presence of the severer form of the disease. The secretion of purulent matter from the surface is most obvious after the night's rest; the eye-lashes are gummed together by it; clots produced by the evaporation of the more fluid parts of the discharge are formed at the angles; and when the lower lid is depressed, flakes and films of it may be observed in considerable quantity. The existence of purulent discharge is not so obvious in the course of the day, especially if the patient has been in the open air, the irritation of the surface causing such a flow of tears as removes it as fast as it is secreted. In this case, inquiry should be made as to the state of the eye upon awaking in the morning, and the patient should be allowed to remain for a quarter of an hour with the eyes closed, when, upon depressing the lower lid, flakes of yellow matter may be seen floating in the tears. The sufferer experiences repeated attacks of scalding pain, with copious flow of tears, so much resembling the effects of a mote or grain of sand beneath the lid, that he can scarcely be persuaded that such does not actually exist. Vision is not very materially impaired during the prevalence of these symptoms, but there is generally a slight degree of haziness experienced, especially when looking at the flame of a candle, and occasionally alarm is excited by tenacious films of purulent matter adhering to the cornea.

The symptoms here enumerated continue for two or three days; the period depending much upon the circumstances under which the patient is placed: they then begin to yield and alter, the painful sensation of a foreign body beneath the lids, with scalding and flow of tears, becomes less frequent, the vascularity loses its intensity and shining appearance, and the purulent discharge is more freely secreted. Subsequently, these symptoms gradually diminish and finally disappear, leaving the parts somewhat more vascular and irritable than before this attack; but in a few weeks this condition disappears, and the recovery is complete. That this is the true history of the symptoms, progress, and termination of mild conjunctival inflammation in a healthy subject can scarcely be denied; but it is not the history of the disease as it is observed in daily practice. This simple form of inflammation must obviously disappear after passing through its different stages, unless the natural processes tending to recovery be interrupted. This interruption, however, generally takes place. The disease is frequently exasperated, and the efforts of nature to restore the healthy functions of the part suspended by injudicious, unnecessary, or injurious interference; or it is so modified by scrofulous constitution, or by neglect, filth, and deficient food and clothing, that its character is totally altered.

The treatment of mild conjunctival inflammation is as obvious as the disease is simple. The bowels should be emptied, and the secretion from the mucous membrane of the intestinal canal excited by purgatives in moderate and repeated doses. The infusion of senna and tamarinds, with the addition of sulphate of magnesia and of tartrate of antimony in the proportion of a grain to eight ounces, may perhaps be preferred for this purpose. The abstraction of blood by the lancet is seldom required; but it is frequently necessary to apply eight or ten leeches to the hollow of the temple behind the external angular process of the frontal bone, or over the cheek-bone. The bites of leeches in the thin and flaccid skin of the eyelids generally produce so much irritation and inflammation, that their application there is often injurious. Locally, cold or warm applications may be resorted to, according to the relief the patient experiences from one or the other. If there be much heat and scalding pain, a light fold of old linen, wrung out of cold water, may be laid over the closed lids, and changed as it becomes warm; or a soft sponge or scrap of flannel, wrung out of hot water, and held in the hollow of the hands beneath the eyes, may be used to induce the soothing effects of warm moisture. At bedtime the edges of the lids should be smeared with cream, unsalted butter, or any other oily application not rancid or burned. Rest of the lids should be enjoined, as the constant friction of the surface greatly increases the irritation; the eyes should be kept closed as much as possible; but the patient should not be immured in a dark room, or have his eyes covered with a shade, as is frequently practised. The propriety of applying astringent washes to the inflamed surface during the first stage of the disease may be justly questioned. It is not to be denied that such applications may have the effect of arresting the progress of the disease at once; but if they have not that effect, they are liable to produce an increase or irritation. In Dublin, where no adequate relief is afforded to the destitute poor in their own homes, it is often expedient to endeavour to cut short the disease by the direct application of a strong astringent solution, to prevent the establishment of that chronic vascularity and opacity of the cornea which filth, starvation, and rags would otherwise produce. For this purpose, a saturated solution of acetate of lead or alum may be resorted to with perfect safety and decided effects, and a few drops introduced between the lids every night and morning. To remove the vascularity and that condition which accompanies the secretion of purulent matter, weaker astringent solutions may be used more freely. Five grains of alum or of the acetate of lead to an ounce of water, make a wash as efficient and safe as any other of the various salts resorted to for this purpose: the comparative value of these will, however, be presently considered.

In addition to the above observations, an abstract of Mr. Lawrence's valuable account of catarrhal ophthalmia, delivered in his lectures,

may not be inappropriate. He observes that it originates from atmospheric causes or peculiarities, is caused by exposure to cold, and corresponds to catarrhal affections of other mucous membranes. In individuals predisposed to this affection, being out in an east wind for a quarter-of-an-hour, or half-an-hour, will sometimes infallibly bring on an attack. He enumerates the following symptoms: — stiffness, smarting, uneasiness from exposure to light, watering and external redness, followed by mucous discharge, without considerable pain or intolerance of light. The conjunctiva becomes of a scarlet colour in mottled patches at first, but subsequently of uniform appearance, the redness commencing at the circumference, and extending to the cornea. Sometimes spots of ecchymosis occur in the vascular network from the activity of the inflammation, and occasionally pustules round the margin of the cornea; but true chemosis never exists. The characteristic symptom of a sensation of a foreign body beneath the lid he attributes to the irregularity of surface produced by vascular distension. The secretion from the surface is at first thin, but subsequently becomes of a thicker consistence and whiter colour, resembling pus, at first confined to the inner angle of the eye, or to the fold of reflection of the conjunctiva, but afterward is poured out in sufficient quantity to agglutinate the lids at night. These symptoms are accompanied by those of inflammation of other mucous membranes, and are found to remit by day and to become exasperated at night. The affection, he says, passes through a certain course and then subsides, yields readily to treatment, and is, generally speaking, free from danger unless improperly treated. It is distinguished from the severe purulent ophthalmia by its milder character; and although the appearances of the two approximate, yet the difference is rather in degree than in kind. The disease, he observes, demands mild antiphlogistic treatment: cupping and leeching in ordinary cases, and occasional venesection in full habits; an active aperient, sometimes an emetic, followed by saline and sudorific medicines and diluent drinks. Locally, he recommends warm in preference to cold applications; but observes that the latter are sometimes comfortable to the patient, and not injurious; and after the inflammation subsides, suggests the application of blisters, exposure of the organ to the air, and he objects to shading the eye unless there be intolerance of light.

2. Severe Inflammation of the Conjunctiva, commonly called Purulent Ophthalmia.—The severer form of conjunctival inflammation presents itself in three different shapes, the *Egyptian*, or, as it is called for distinction, the *purulent* ophthalmia, *gonorrhœal* ophthalmia, and *purulent* ophthalmia of infants. These three forms, if not specifically distinct, and characterized by peculiar symptoms, are at least distinguished from each other by origin, history, progress, and consequences. The common severe purulent ophthalmia is to be now considered. This disease probably always existed in the form in which we at present occasionally observe it; but the attention of the profession was particularly called to it upon the return of the troops from Egypt, among whom it spread with such uncontrollable violence and destructive consequences, that it acquired the title of Egyptian ophthalmia. The following history of the disease, as it occurred at that period, is extracted from Dr. Vetch's Treatise on Diseases of the Eye. "The British army which formed the first expedition to Egypt left that country in three divisions. Great part of the whole touched at Malta, and a considerable portion also at Gibraltar, at which places ophthalmia not only continued to present itself in the regiments which had brought it with them, but was communicated at the former place to several women with whom the soldiers associated; and at Gibraltar it became from that time by no means an unfrequent complaint among the troops who had never been in Egypt. On the whole, however, the climate of Gibraltar has proved rather favourable than otherwise to the amelioration of the complaint. From Malta and Gibraltar the greatest part of the army proceeded to Great Britain and Ireland. In two regiments of fencibles disembarked at Portsmouth, the disease continued to present itself from the time of their landing until they were disembodied a short time afterwards. The regiments disembarked in Ireland having been placed in the same barracks and garrisons with the Irish militia regiments, the infection appears, from such evidence as I have been able to obtain, to have been communicated to them. If the disease existed at all in England, it seems to have been entirely overlooked till the summer of 1804, when it appeared with alarming violence in the second battalion of the fifty-second regiment, at that time stationed with the light infantry division in barracks, near Hythe in Kent. Not a man of this battalion had been in Egypt, and it was entirely composed of a body of volunteers received in one draft from the Irish militia, and very shortly after their arrival at Hythe the disease made its appearance. It continued to disseminate itself more extensively in this regiment during the remaining part of 1805; and in the following summer of 1806 it also began to prevail in the first and second battalions of the forty-third regiment, and the first, second, and third battalions of the 95th, all stationed at the same place and under the same command. Whether the disease was spread from the battalion in which it first commenced, or was derived from the same source, that is, the Irish militia, of which the others were equally composed, it would be now difficult to determine. The battalion in which this renewal of the infection first showed itself in this country was the second of the fifty-second, and a very considerable number of cases had occurred in the first battalion when it embarked for Sicily in 1806. From the time of their landing in Sicily the disease continued to cripple this otherwise fine battalion. Part of the army of Sicily was dispatched to Egypt, and on its return to Sicily a fresh stock of the infection of ophthalmia was brought with it; but the disease, or an infectious ophthalmia of the same character, was in the first instance carried to Sicily from this country by the first battalion of the fifty-second regiment. From this station alone, I believe more than one hundred and thirty cases were sent home totally blind. When the disease had existed for some time in the light infantry brigade, composed, as I have

already stated, of the fifty-second, forty-third, and ninety-fifth regiments, stationed in Kent, it broke out in other regiments which had no communication with the former, but had formerly suffered much from the disease in Egypt, though till this period it had remained either altogether dormant, or prevailed in an extent so limited as to escape attention. Three hospital stations were established for the exclusive reception of those affected with the disease, towards the latter end of 1807, to the superintendence of which I was appointed. The numbers were chiefly composed of men from the regiments already mentioned; but in the summer of 1806 it contained no less than nine hundred cases, consisting of detachments from more than forty different corps. Previously to the sailing of the expedition to Walcheren in 1809, the number of acute and highly purulent cases was also very great, but as they were received in an early stage of the disease, there was little or no eventual loss, and from that period the disease continued to decline."

Dr. Vetch proceeds to account for the disappearance, temporary suspension, and recurrence of the disease, by attributing such recurrence to relapses with return of purulent discharge occurring in crowded barracks. He ascribes the comparative exemption from the disease enjoyed by the French army, to the circumstance of their not being confined to barracks or subjected to fastidious discipline, but bivouacking in the field, or being quartered on the inhabitants of the towns they occupied; and in proof of it, instances the exemption enjoyed also by the English troops in the peninsular war. In Ireland, at the period alluded to by Dr. Vetch, the disease raged with perhaps still greater violence, and in consequence of want of sufficient accommodation for the numerous cases in the military hospitals, wards were opened for their reception in Stevens's hospital under the direction of Mr. Colles, where the writer had an opportunity of observing its extensive ravages, and the comparative value of the different means adopted for its removal. That the disease here spoken of is the same as that now observed, and commonly denominated purulent ophthalmia, can scarcely be doubted; and although its appearance among the troops in Egypt, and its subsequent history, has conferred upon it a certain distinction of character, yet it can scarcely be denied that it existed previously, and perhaps more particularly in Ireland.

The condition or symptoms which characterize the severer forms of conjunctival inflammation or purulent ophthalmia, whether Egyptian, gonorrhœal, or infantile, are the chemosis or turgid vascularity with effusion of serum into the subjacent cellular membrane; sloughing, abscess, or ulceration of the cornea; and alteration in the structure of the conjunctiva leading to granular lids and vascular and opaque cornea. The symptoms as they actually occurred in the form of the disease just alluded to are so well described by Dr. Vetch, who enjoyed ample opportunities of observing the disease, that his account is here introduced. "The first appearance of inflammation after the application of the virus is observable in the lining of the lower eyelid. It assumes first a mottled appearance and then a fleshy redness. A little mucus is generally present at the doubling of the conjunctiva at its lower part. The disease I know from observation may remain in this state for twelve hours before it invades the conjunctiva covering the eye; sometimes it may be longer; and in some cases where the contact of the virus has been slight, or removed by immediate washing, the disease never went farther than producing the redness of the lining of the palpebra. In sclerotic inflammation the lining of the eyelids preserves in some degree its natural whiteness, especially just under the tarsi, for days and weeks. The progress of the inflammation, when it extends from the conjunctiva of the eyelid to that covering the globe of the eye, is often so rapid as to elude any distinct observation; but frequently it advances more gradually, preserving a defined line, till it extends over the whole membrane as far as the cornea. No part can be said to be more vascular than another, as the whole seems equally injected, and no space unoccupied. The disease is often thus far advanced before the attention of the patient is so much excited as to make him complain; a certain degree of stiffness being sometimes the only sensation which accompanies it. The first and chief uneasiness in this stage of the disease is described as arising from the feeling of sand or dirt rolling in the eye. This sensation is not constant, as it comes on suddenly and as suddenly departs, confirming to the patient the idea of something extraneous being lodged in the eye. I have always observed that its attacks are in the evening, about the time of going to bed, or very early in the morning. Their duration varies; sometimes an attack abates in an hour, and sometimes continues the whole night; those coming on in the evening being always the most severe. This symptom requires particular attention, as its accession is a certain index of the disease being on the increase. From the observations I have already made, its exacerbations and remissions are easily explained. When a vessel on the globe of the eye is first injected and rendered turgid, it excites an uneasy sensation in the conjunctiva of the palpebra, the same as if it moved over a particle of sand or extraneous matter. As the tone of the vessel diminishes, and the lining of the eyelids becomes accustomed to the new feeling, the painful impression ceases. A farther increase of the turgidity of the vessels already distended, or the distension of others, serves to excite afresh this feeling of uneasiness. The time at which I have said that this symptom generally comes on is when the patient is preparing for sleep, because he is then confined to a closer atmosphere; and not only is the eye deprived of the beneficial effects of the open air, but the temperature is farther increased by the closing of the eyelids in the attempts to sleep. The first stage of the disease may be, therefore, characterized by its great and uniform redness, without that pain, tension, or intolerance of light which accompanies most other forms of ocular inflammation; — exactly the reverse of which takes place when inflammation affects the sclerotic coat. From the beginning of the operation of the virus, there is a disposition to puffiness in the cellular texture between the conjunctiva and globe of the eye. The puffiness often suddenly swells out into

a state of complete chemosis; and at other times it makes a more gradual approach to the cornea, advancing equally on all sides; the close attachment of the membrane at this part causes the swelling as it were to double over the margin of the cornea. While effusion is thus taking place upon the eye, œdema is likewise going on beneath the integuments of the palpebræ. This effusion ought to be considered as perfectly continuous with the chemosis arising from the internal surface of the conjunctiva, and following its reflection on the eyelids. To the œdema of the palpebræ, there is no other resistance than what the integuments afford; and, therefore, in a short time, it forms a tumour of astonishing magnitude, and the external swelling may by its pressure prevent the chemosis from acquiring the magnitude which would otherwise occur. This enormous tumefaction of the palpebræ is generally consentaneous with the complete formation of the chemosis, which is when it has reached the cornea and surrounds it. In proportion as the integuments of the palpebræ, by yielding to the œdema, swell out, they drag the tarsus to which they are attached inwards, producing inversion of the eyelid; and the integuments of the upper and lower eyelids meet, forming a deep sulcus between them. To examine the eye, it is therefore necessary, first to introduce the finger to the bottom of the sulcus, and then, by separating the swollen eyelids, to bring out the inverted cilia. Unless our treatment have an immediate effect in reducing the external œdema, few cases admit of any very minute examination of the eye itself. With the accession of the external swelling, the discharge, which was before moderate and consisted of pus floating in the watery discharge, now flows in a continued stream of yellow matter, which, diluted with the lachrymal secretion, greatly exceeds in quantity that derived from the most violent attack of gonorrhœa. The clothes, and anything within the reach of contact, soon become embued with the matter, the smallest particle of which is capable of producing infection. Although the tumefaction may be at first farther advanced in one eye than the other, it generally reaches its maximum of height in both about the same time.

The patient, reduced to a state of great uneasiness by the irritation of the swelling, and by its confining the discharge, begins now to suffer attacks of excruciating pain in the eye itself. This is chiefly what indicates the mischief going on, and from which the patient must be immediately rescued, in order to save the organ. Here it is enough to observe, that the medical adviser must be careful how he allows himself to be lulled into security by any remission or palliation of this symptom. An occasional sensation, as if needles were thrust into the eye, accompanied with fulness and throbbing of the temples, often precedes the deeper-seated pain. This last is often of an intermitting nature, and a period of excruciating torture is succeeded by an interval of perfect ease. Under the latter form, I have met with it in the greatest number of cases, and the exacerbation and remission have often occurred with great regularity. Sometimes the pain shifts instantaneously from one eye to the other, and is seldom or never equally severe in both at the same time; and sometimes, instead of the eye, it occurs in a circumscribed spot of the head, which the patient describes by saying, he can cover the part with his finger. Sooner or later, one of these attacks of pain is terminated by a sensation of rupture of the cornea, with a gush of scalding water, succeeded by immediate relief to the eye in which this event has happened, but generally soon followed by an increased violence of the symptoms in the other. This first sensation of rupture is, when the disease is left to improper treatment, often followed by a second and a third; till, exhausted by its own violence, the attacks become shorter and less severe; not, however, till after the lapse of many weeks, and even months, do they altogether cease. During this stage of the disease, there is seldom the slightest alteration of the pulse unless the lancet has been freely employed. The patient's general health is little impaired, his appetite continues natural, but sleep almost totally forsakes him. As the pain abates, the external tumefaction subsides also, and a gaping appearance of the eyelids succeeds. This may be termed the third stage of the disease. The ciliæ, which before had been pushed inwards, are now separated, and stand outwards. The previous inversion of the cilia may be explained by comparing the palpebra to a sail bent to a rope; the more the sail is distended, the cord is drawn upwards and inwards. The swelling of the second stage having abated, the eyelids are prevented assuming their natural state, in consequence of the granulated state of the conjunctiva which lines them; and now eversion, more or less, takes place. This in general proceeds, however, no farther; but between this state and a complete eversion there is every degree of a diseased or granulated state of the inner surface of the palpebra. In some cases it disappears rapidly and of itself; in others it forms an inveterate disease, and, combined with some degree of sclerotic inflammation, becomes the cause of opaque cornea. The pain of the second stage of the disease arises, in part, from the destructive changes which have commenced in the cornea, aggravated by distension of the eye, consequent upon an augmented quantity of an aqueous humour. The formation of that fluid, I have already hinted, may take place through the medium of the ciliary processes, and the appearance of the cornea gives no reason to suppose that its internal surface partakes of the inflammation, or that the aqueous humour is increased by any morbid effusion. The distension seems entirely owing to an augmented activity in the secreting vessels; and these certainly are situated in the posterior chamber. Neither does there appear any reason to warrant the idea that the ulceration ever proceeds from within outwards. But the distension of the anterior chamber probably favours the escape of the aqueous humour sooner than it would otherwise happen. The swelling and the purulency prevent us from making any very accurate examination to ascertain the progress of the ulcer. The account I have given of it in a former chapter is an analysis of what takes place in ophthalmia. When any large portion of the cornea sloughs, an adventitious and vascular membrane is often produced, which finally forms a staphylo-

ma. In some few cases, I have seen the lens and its capsule exposed without any external covering whatever, and for a short time the patient sees every thing with wonderful accuracy; but as soon as the capsule gives way, the lens and more or less of the vitreous humour escape, the eye shrinks, and the cornea contracts into a small, horn-coloured speck. This total destruction of the globe of the eye generally insures the safety of the other, and renders it less liable to be affected by future attacks of inflammation. When one eye is lost by styphyloma, and the other remains useful, it is well to do what nature has left undone, and, instead of attempting to reduce the sac by puncturing it, at once to lay it open and extract the lens."

The account here given by Dr. Vetch is calculated, in an eminent degree, to impress on the mind of the student the importance of this disease; he is not, however, to expect to meet with it in this form in daily practice. He will not always have an opportunity of observing the first symptoms of the attack, as the patient seldom presents himself until the complaint is fully established, and he will not often find the symptoms so rapid in progress or violent in degree. The practitioner, in studying an individual case, has before him the vascularity, tumefaction, scalding pain, and purulent discharge in the severest form. His first consideration should be to recall to his memory the dangerous consequences which he is called on to avert, and which constitute the prominent symptoms of the disease. In the first or inflammatory period, he is to recollect that the eye may be lost by sloughing or abscess of the cornea, or by suppuration of the whole eye-ball; in the second stage, he has to apprehend the injury or destruction of the cornea from ulceration, or that change of organization of the conjunctiva which proceeds to permanent increased vascularity, and that peculiar condition denominated granular lids. The nature of the pain experienced by the patient should receive particular attention: if it be the characteristic scalding sensation of sand beneath the lids, it is indicative of severe conjunctival inflammation only, but if this be accompanied by intense aching, extending to the temples and sides of the head, it is evidence of the extension of the inflammation to the eye-ball itself; the cornea and fibrous sclerotic refusing to yield to the distension of inflammatory action, like muscular fasciæ and the coverings of joints under similar circumstances.

As sloughing or abscess of the cornea is the consequence most to be apprehended during the inflammatory period, the practitioner watches with anxiety for any appearance indicative of this evil. It is not perhaps possible to detect the first change which the cornea undergoes in this process, but when this transparent structure assumes a dirty white opaque appearance, either wholly or partially, the mischief is easily recognised; and when subsequently the sphacelated portion comes to be cast off by the usual process of ulceration, and exhibits a line of separation between the dead and living parts, no doubt of the nature of the injury can be entertained. Abscesses in the structure of the cornea are also liable to occur during the inflammatory period, and have probably been often confounded with the sloughing here described, the distinction being difficult, and the two destructive consequences sometimes being combined, and constituting a condition analogous to common anthrax. Abscess of the cornea is peculiar in this respect, that it does not appear to consist of a distinct sac of purulent matter, but merely a deposit in the cellular or laminated structure of the cornea; it consequently does not open at one point and discharge its contents, but breaks into an open ulcer, not easily distinguished from the broken surface of a slough. The colour of the opacity of the cornea constitutes the best criterion; if the spot be of the usual straw-coloured tint of purulent matter, and not the dull, dirty white of dead macerated cornea, abscess, not slough, is the process in progress. Abscess, also, probably occurs more frequently in circumscribed spots, and seldom extends to the entire circumference of the cornea. The secretion of purulent matter in the chamber of the aqueous humour is easily distinguished from abscess of the cornea at its commencement, by the purulent matter falling down in the aqueous humour between the iris and cornea, and by its surface assuming a horizontal level, repeatedly described under the title of *hypopion*, *onyx*, or *unguis*; but when the whole chamber is filled with pus, and the cornea consequently presents a uniform yellow appearance, the real nature of the appearance is not so obvious.

Causes.—In every day practice, where the cases are comparatively few, the inquiry into the cause of the complaint is not so important as when numbers of persons collected together are violently attacked; because the occurrence of a few instances of the disease would not justify the adoption of preventive measures by a large community, which are imperatively called for where it rages among smaller numbers more crowded together, as in barracks, schools, and ships. That any cause producing irritation of the conjunctiva,—as strong light, currents of cold air, or the contact of dust blown through the atmosphere,—or any cause usually producing inflammation of mucous membranes,—as sudden transitions from heat to cold, or peculiar conditions of the atmosphere,—is likely to produce purulent ophthalmia, can scarcely be denied; but the extent to which these causes operate, or the circumstances under which they become influential, have not been ascertained. The occurrence of the disease in particular countries, and in barracks, schools, and ships, is notorious; but the real causes of such occurrence have not been satisfactorily determined.

The rapid extension of the disease among the individuals of crowded communities has naturally led to the belief that it is contagious, and not only communicated by actual application of the discharge of a diseased eye to a sound one, but even through the medium, whatever it may be, by which diseases notoriously contagious are transmitted. The discussion respecting the contagious nature of the affection is involved in the same difficulties and contradictions which embarrass the inquiry into the nature of contagion in general: sufficient facts, however, have been adduced to justify the separation and removal of communities among whom the disease breaks out, and to induce the prudent practitioner to enjoin the greatest attention to the prevention of contamina

tion by actual contact of the matter of the disease with the eyes of those not affected by it.

Prognosis.—The prognosis in severe purulent conjunctival inflammation must obviously be most cautious. The patient should be made fully acquainted with the immediate danger of destruction of the organ to be apprehended from sloughing or suppuration, as well as the prospect of slow and doubtful recovery in consequence of the great alteration or disorganization of the conjunctiva produced by the intense inflammatory action. In forming his prognosis, the practitioner must of course be guided by the degree of violence of the attack, the habit and constitution of the patient, and the experience he has had as to the modification of the disease by climate or other circumstances.

Treatment.—In severe conjunctival inflammation the principles inculcated in the commencement of this article should not be overlooked. The resources available for arresting the inflammatory action are, as has been observed, bleeding general and local, emetic and nauseating medicines, purgatives, diaphoretics, and, according to some, mercury. Locally, astringent, sedative, stimulant, cold or warm applications, and occasionally blisters, scarifications, and other remedies directed to peculiar conditions, must be resorted to. Before the practitioner makes up his mind respecting the value of bleeding in this disease, he should pause to consider the effect of this depletion in arresting inflammation of mucous membranes generally; and having done so, he will probably be prepared to admit that in many cases the lancet is not so valuable a resource as might be expected, or as it is found to be in inflammation of serous membranes or other structures. The advantage of bleeding in croup cannot be denied, but it is to be recollected that this disease is more liable to terminate in effusion of coagulable lymph than in secretion of purulent matter. Catarrhal inflammation of the lining membrane of the nostrils or the trachea and bronchial tubes, and dysentery in the acute form, are treated by bloodletting more with the view of diminishing the febrile symptoms than with the hope of cutting short the local inflammatory action. Bleeding will not cure conjunctival inflammation, but it is a most valuable auxiliary means of relief, by reducing the part to a condition in which other remedies become more effectual. The writer has seen the abstraction of blood carried to the greatest extent possible, consistent with the safety of the patient; he has seen repeated bleedings of forty, fifty, and even sixty ounces, and streams flowing from the arm and temporal artery at the same time, without generally beneficial results. More moderate bleedings, suited to the intensity of the symptoms, habits, and constitution of the patient, should, however, form part of the treatment. It is scarcely necessary to say that persons emaciated by want, enervated by drunkenness and debauchery, or debilitated by respiration of impure air, are not fit subjects for a system of depletion; on the contrary, such treatment is most destructive to them, and the very reverse of it is demanded.

The means by which blood should be removed, or the sources from which it should be drawn, deserve consideration. Many prefer opening the temporal artery, from a theoretical notion that by emptying one branch of an artery, those ramifying from the same source have the force of their currents diminished; but it never has been proved that this is actually the case, and it may even be doubted that any advantage is derived from the preference, while much inconvenience, irritation, and heat is produced by the bandage required to secure the wounded vessel. If advantage be derived from a local diminution of the circulating fluid, it may more reasonably be expected from opening the jugular vein; because in this case this vessel cannot, like the temporal artery, be instantly refilled by the heart's action: therefore, when the size of the vein, the formation of the patient, and other circumstances are favourable, this vessel should be selected. Bleeding in the arm, however, from its greater convenience, and the ease with which it may be performed, is generally preferred, and perhaps in the majority of cases without disadvantage to the patient.

The local abstraction of blood by leeches or cupping is the next resource, after the effect of the general depletion has been ascertained; it may be resorted to in the evening if the general bleeding took place in the morning, or, according to the urgency of the symptoms, may be postponed till the following day. Twelve, eighteen, or twenty-four leeches should be applied to the temple or over the cheek-bone, so as to leave an opportunity of stopping the bleeding by pressure should it become necessary. The irritation, inflammation, and tumefaction produced by the application of leeches to the swollen eyelids more than counterbalances the good, if any, derived from emptying the vessels of the inflamed part. The advantage from the bleeding by leeches appears to depend upon the continued trickling of blood, which is perhaps best encouraged by the application of compresses of old linen wrung out of warm water and removed and replaced every ten minutes, or as often as they become soaked with blood. The application of a few leeches to the conjunctiva of the lower lids has latterly been recommended and practised, and may perhaps be resorted to with safety and even advantage in the after stages of the disease; but in a case of violent purulent ophthalmia threatening destruction of the eye, the effect is too inconsiderable to risk any aggravation of the inflammation by the leech-bites.

Local abstraction of blood from the inflamed conjunctiva by scarification has been practised from the most remote periods; the same objection may be made to it as is offered to the application of leeches, that is, the small quantity of blood drawn, and the great extent of injury inflicted. When the chemosis or vascular tumefaction of the conjunctiva is very great, and the membrane projecting between the lids or overlapping the cornea, the writer, in place of merely scarifying or scoring the surface, runs an extracting knife from one end to the other of the tumour, by which the effused serum is allowed to escape, tension is relieved, and generally a considerable quantity of blood discharged. From this practice advantage is frequently derived without any injurious consequence either temporary or permanent.

As it is of the utmost importance that the practitioner should be informed as to the value of

bleeding in this disease, the opinions of Dr. Vetch, Mr. Lawrence, and Mr. Guthrie, are here subjoined. Dr. Vetch observes, "A perfect command over the disease depends less on lowering the system than on the temporary cessation of arterial action by the syncope, which it becomes the object of the operation to produce. This practice, besides its efficacy, will accomplish the cure with a much less expenditure of blood than is occasioned by the repeated bleedings generally had recourse to, where this method of rendering one equal to the cure of the complaint has been neglected. Sometimes, before the approach of faintness, the redness of the conjunctiva for the most part disappears; but this is no security against the return of the disease, if the flow of blood be stopped without deliquium animi succeeding." And again, (page 217, Treatise on Diseases of the Eye,) "Of three thousand cases admitted into the ophthalmia depôt, I am not aware of any one in which the practice of depletion, assisted by the remedies mentioned, did not prove effectual when the patient was received under the first attack of the disease." He then states that twenty-five men only were lost to the service of all those admitted into the ophthalmic depôt; "but an unfortunate feature of this very dreadful complaint is its great tendency to recur, even after the eye has recovered its healthy and natural appearance; and although it be in our power to conquer its present violence, no treatment can prevent relapses from taking place. As long as the lining of the palpebræ continues villous, this accident is liable to recur, with all the severity of the original attack." From this last observation it is to be suspected that numbers of these men were discharged as cured when labouring under pulpy and villous conjunctiva, subsequently proceeding to granular lids and opaque cornea; especially when it is known that thousands were lost to the service notwithstanding the prevalence of the bleeding practice.

Mr. Lawrence (Lectures, reported in the Lancet,) says, "The first measure is to take blood from the arm, and this in large quantity, so as to produce syncope: you may expect to derive much more benefit from one bleeding of this kind than from the repetition of smaller ones. It may be necessary to repeat the venesection; and if the symptoms should remain urgent, you must not hesitate to do it: you may subsequently take blood by cupping from the temple, and apply numerous leeches about the eye." In his account of gonorrhœal ophthalmia, bleeding is still more strongly recommended.

Mr. Guthrie (Lectures, reported in the Medical and Surgical Journal,) states, "It was deemed necessary to abstract blood in large quantities; indeed sixty, eighty, and even one hundred ounces have been drawn. It was often thought necessary to re-leech the eye and blanch the countenance to effect a cure, and I have no doubt that it has been done with success; and the extreme vessels of the conjunctiva have been so drained as to be rendered incapable of going on with the secretion. Those who find fault with this practice in all probability never saw the disease; for it is the most efficient mode of proceeding, and the best when there are no local means employed."

After the requisite depletion by the lancet, the practitioner avails himself of the other resources within his reach. If there be reason to believe that there are crudities in the stomach, with foul tongue and headach, an emetic may be administered with advantage; and when the nausea subsides, the bowels should be freely opened, and the discharge kept up by the administration of suitable medicine at proper intervals. A few grains of calomel at night, followed by repeated doses of the common mixture of infusion of senna and sulphate of magnesia in the course of the following day, may probably answer every purpose. From the advantage derived from nauseating medicines in other forms of inflammation, similar advantage has naturally been expected from its administration in purulent ophthalmia; but in consequence of their not answering the exaggerated expectations of the practitioner, they have not, perhaps, been resorted to to that extent they deserve. The effect may be advantageously secured by the addition of tartar-emetic to the purgative mixture, or the same medicine alone in solution may be given after the bowels have been freely opened, in doses sufficient to produce slight nausea, and secretion from the skin encouraged at the same time by confining the patient to bed. Tobacco has been resorted to for the purpose of exciting nausea; but experience has not yet proved that it possesses any superior advantage, while we are less familiar with its effects than with the preparations of antimony. Mercury has been recommended and resorted to for the removal of conjunctival inflammation, but with little success. The opinions of Mr. Lawrence, Beer, Delpech, and others, are unfavourable to the practice. Without accomplishing any valuable object, it reduces the patient to the condition which is most calculated to perpetuate the destructive change in organization of the conjunctiva.

Whatever importance is to be attached to the opinions of English writers on the present subject—respecting the paramount value of bleeding and low living in the treatment of the disease, the Irish practitioner must undoubtedly be circumspect, in this respect, in his treatment of the poor. It may be very well to bleed and otherwise reduce those who have been well fed and have enjoyed all the comforts of life; but the practice is utterly inadmissible in a country where the poor are abandoned to a state of destitution, and, if not absolutely starved, are so ill fed, and clothed, and lodged, that frequently no healthy action can be roused until the constitution be invigorated. In Dublin it is often absolutely necessary to place a patient, a few days after the first attack of purulent ophthalmia, on full diet, consisting of animal food with ale or porter, accompanied by the administration of bark or other tonics.

In the treatment of purulent ophthalmia the management of the patient, with respect to the temperature, ventilation, and lighting of his apartment, should not be overlooked. The practice of immuring a patient in a close room, with windows shut and curtains drawn, and with the addition of an enclosure of curtains round his bed, involving him in a contaminated atmosphere loaded with the excrementitious effluvia of his body, is most pernicious. The close, stinking, crowded, and darkened ward to be found in some hospitals, called

the eye-ward, is equally destructive. The author of this article has almost daily opportunities of witnessing the refreshing and salutary effects of what may justly be called a meal of fresh air, on persons subjected to such treatment; and he invariably finds that patients obliged to go out of doors are more easily managed, and escape with less injury, than those confined in the way just mentioned.

With respect to this part of the treatment, Dr. Vetch makes the following observations:—"I entertain so favourable an opinion of the effects of the free exposure to the atmosphere, that although no person can better appreciate the importance of decisive measures in the early stage of the disease, I would in favourable weather risk the delay of a journey on foot or horseback, or in a carriage, or a voyage by sea, provided the eye be freely exposed to the air. Even when the second stage has commenced, by the appearance of a chemosis and purulent secretion, I have never seen any other than the best effects to attend a change of place. Soldiers who have commenced a march with the disease completely formed, though exposed to heat, dust, and fatigue, and not abstaining even from intoxication, are invariably better at the end of the journey than when they set out. The instances of this fact which I could adduce from my own observation are innumerable; and I am informed by Mr. Murray, surgeon to the forces, that so strongly did he observe the beneficial effects of exposure to the air, when a great number of men affected with the disease was sent, under his care, to the interior of Sicily, that he was induced to march them from one place to another, with a view solely to the good effects he saw resulting from it."

In considering the local treatment of severe purulent ophthalmia, the first and most important point to be determined is the value of powerfully stimulant or astringent applications made directly to the inflamed conjunctiva in the first or inflammatory stage of the disease. The great advantage of strong astringent solutions in arresting the progress of that disorganizing change which follows violent conjunctival inflammation is undeniable; but it requires much circumspection to avoid confounding the advantages derived from astringents in the chronic stage with those derived from similar applications in the acute. The question to be determined is, whether a powerful stimulant or astringent, as ten or twenty grains of nitrate of silver in an ounce of water, or ten grains in a drachm of lard, can be with safety and advantage applied to the surface of the inflamed conjunctiva in the first attack of violent purulent ophthalmia. When a patient presents himself in the first stage of purulent ophthalmia, with severe scalding pain, and with the conjunctiva in a state of chemosis, overlapping the cornea and projecting between the eyelids, few practitioners will feel inclined to soak the eye in a ten grain solution of nitrate of silver, or thrust a portion of the ointment (ten grains to the drachm) between the lids and the swollen and turgid conjunctiva. The most strenuous advocates for the stimulating practice inculcate the necessity of allaying inflammatory action before or during its adoption. Whether incipient purulent ophthalmia of the character now under consideration can be at once cut short or not by the application in question, has not yet been established to the full satisfaction of practitioners. The circumstances under which the experiment may be made to enable the observer to arrive at a just conclusion seldom occur, because he rarely meets a case in its very onset which he can pronounce to be violent purulent ophthalmia, the severe characteristic symptoms not being yet developed. If purulent ophthalmia rages in a regiment, a school, or a ship, and the surgeon, watching narrowly the symptoms of the accession of the disease, applies this stimulating astringent to the surface with decided effect; or if a patient in the hands of a practitioner for the treatment of gonorrhœa presents the symptoms of conjunctival inflammation, and is similarly treated with similar good effects, the question must be determined in the affirmative. Several military surgeons, who have enjoyed the best opportunities of observing and treating the disease, are decidedly favourable to the practice.

Mr. Lawrence, however, in his book on Venereal Diseases of the Eye, speaks of it with caution and reserve. After quoting the authority of Mr. Melin, Mr. Bacot, Dr. Ridgeway, and Dr. O'Halloran, on this subject, he observes, "I have not seen purulent ophthalmia, whether ordinary or gonorrhœal, treated on this plan; nor am I aware that any case of the latter kind is recorded. Destructive or injurious consequences have so frequently resulted under the usual management of this disease, that I should certainly employ the local astringent if I met with a case favourable for the trial; that is, where the affection had not extended beyond the conjunctiva. Bloodletting might be resorted to at the same time. In most cases, however, our aid is not sought until the cornea has become affected; and it is, therefore, too late for the astringent plan." In a note he adds, "Since the statement in the text was written, I have employed the caustic solution in two cases of conjunctival inflammation with the best result. One of these was mild gonorrhœal inflammation. The other was catarrhal inflammation of the membrane, affecting both eyes of a gentleman who had been convalescent from gonorrhœa for a few weeks. As he was a person of robust make and full habit, and the eyes were very red and stiff, I took three pounds of blood from the arm, and purged him freely, with relief of the local symptoms, which were completely removed by a subsequent application of the caustic solution."

The practice here alluded to is advocated so strenuously by Mr. Guthrie, that it is desirable to have his opinions conveyed in his own words. The following extract is, therefore, made from his lectures reported in the Medical and Surgical Journal. "In the more formidable affection which runs its course in three or four days, neither the nitrate of silver in solution nor the vinum opii are effective; it requires a more powerful local application. The disease begins externally, and is a local disease of a peculiar character. If we can set up a new action, or alter that which is going on, we check the original affection, according to the principle of John Hunter, that no two diseases or actions go on at one and the same time.

Acting on this principle, I took the nitrate of silver in substance, and made it into an ointment. I did not arrive at its exact composition at once, but gradually acquired it by degrees; it was made at various times, of five, six, ten, and twenty grains to the drachm; and after trying all these different preparations, I came to the conclusion that the ten grain ointment was the best. Take half a drachm of the salt, and powder it in a glass mortar, then sift it through a bit of muslin, so that it is reduced to an impalpable powder, for if there are any grains left, they will stick in the cornea, or in the folds of the conjunctiva, and produce a slough. Ten grains of this impalpable powder should then be thoroughly incorporated with a drachm of hog's lard, on a glass slab with an ivory paper-cutter; and in order to ensure proper attention in the preparation of this ointment, I sought for something to mix with it, which would require some time for its incorporation, and selected the liquor plumbi acetatis for this purpose. Fifteen drops are to be duly mixed with the ointment; and as it generally requires some minutes to do this, there is reason to believe that the trituration is complete. There has been, as usual, some dispute concerning this ointment; the first thing said was that it was violent and useless: well, that has been got over. The second stage was to attribute the introduction of it to some other person. The third to alter the composition, and instead of the liquor plumbi acctatis to mix opium, &c. with it. I have no objection to this, if the gentlemen will only leave me the principle, which is all I contend for. I care not if they change all the component parts, or whether they apply it by a brush of the little finger, or the probe. It has been said that it is soon valueless and inert. All I can say is, let those who think so have it applied to their eyes, and they will soon change their opinion, even if it be a year old. Before the ointment is applied in this purulent inflammation, the discharge must be well cleansed out by a solution of alum; then the ointment having been inserted, the lids must be moved freely up and down so that the whole conjunctiva gets its due proportion of ointment, and this is shown by its turning white. If it does not turn white, it has not been sufficiently applied, and will not answer the purpose; if we wish to be quite sure, we turn out the eyelids, and rub the ointment on them; this application gives pain, which lasts for half an hour to an hour, or more; it is not quite so acute as the vinum opii. I had rather that the pain should last an hour or more, as the action going on is more likely to be changed. When I apply this ointment, I generally direct the patient to lose blood, not to the amount of sixty ounces, but to about twenty, and I had rather that he should faint: and I do this because the application will only alter the action in the extreme vessels, and not that which is behind them in the ball itself, and it is therefore necessary to diminish action in them by bleeding. If, however, the inflammation is moderate, I do not bleed at the time, leaving directions that if the patient is not better in the evening, or the next morning, blood should then be taken. Warm narcotic fomentations may be employed to relieve uneasiness, and opium should be given to allay pain and obtain sleep, while a solution of alum, half a drachm to half a pound, should be injected from time to time in the eye to clear it; but should the patient sleep, he must not be disturbed. A mild ointment may be applied to the lids at night, to prevent their adhering together. The next morning the discharge is again to be removed, and the ointment re-applied, for on no account should the action we are desirous of exciting be suffered to cease; the other remedies are likewise to be continued. In addition to these I would give calomel and opium, so as to affect the mouth, and the other more common remedies; and rest and diet should be attended to. When I hear of twenty or thirty persons losing their eyes from this disease, I say that it must always be so, unless they are treated on this principle, bearing in mind that some diseases in certain persons are incurable from the first, and that no one means of cure is applicable to every case. I am certain, however, from experience, that the plan I have recommended is the most generally efficient and certain of any that has hitherto been advised, whilst it is also less injurious to the constitution."

There is much difference of opinion as to the comparative value of cold or warm applications in the acute stage of purulent ophthalmia. Either in ophthalmic or any other local inflammation, the advantage to be expected from cold applications is the reduction of the temperature of the part, and consequent diminution of vascular action; but this object is very rarely obtained, and the real effect of cold in abating inflammation has as yet scarcely been ascertained. The attempt is made in conjunctival inflammation by repeated applications of cloths wrung out of cold water, but these cloths become so speedily of the same temperature as the part, that nothing more is effected than a temporary cooling, followed by perhaps greater heat and vascular reaction. To obtain the advantages to be expected from cold applications, these cloths should be changed by a nurse, sitting at the bedside of the patient, twice in a minute, or a fold of old linen may be laid across the eyes with the ends hanging into cups on each side, and cold water squeezed on with a sponge, or allowed to drop from a vessel contrived for the purpose. In this way the application of cold as a remedy in ophthalmic inflammation, and especially from wounds or other injuries, is undoubtedly of value, although many patients prefer the effects derived from warm moisture. The following objections made by Mr. Travers to cold applications, in his Synopsis of Diseases of the Eye, are perhaps more applicable to their maladministration. "Although the sensation of cold is most agreeable to an organ under acute inflammation at the moment of its application, it is generally followed by increase of heat and pain; and in familiar instances the pulsatile action of the vessels leading to an inflamed part is so increased as to evince its stimulating effect, and the reaction thereby induced. When, however, the acuteness of the inflammation has subsided, and the sensibility of the part is in proportion diminished, the effect of cold is only tonic, and has a salutary tendency to restore the balance of the circulation. I therefore decidedly prefer a tepid application in the painfully acute stage of inflammation." With the reservation that cold properly applied is not to be des

pised, this advice is good for the purposes of general practice.

Warm applications may be made by stupes, poultices, or light compresses, all of which are generally mismanaged, and frequently do more mischief than good, unless particularly attended to by the practitioner himself. The stuping is generally attempted by wringing a flannel cloth out of a hot decoction of chamomile or poppyheads, and laying it across the patient's eyes, in which case the steam is dissipated, and little of it comes in contact with the eyes. It is best accomplished by the patient himself, who, sitting up in bed, should receive a small piece of flannel, wrung out of the hot water, from the nurse, and hold it in the hollow of his hands under the eyes, changing it as it ceases to give out steam. Many little contrivances may be made for the purpose with sponge or other materials, but holding the eyes over vessels of hot water, or exposing them to steam extracted from a boiling apparatus contrived for this purpose, is not found advantageous, as the heat applied is generally too great. Whether any benefit be derived from the addition of sedative or other medicinal ingredients to the stupe, remains to be proved: it is not, however, attended with disadvantage, and a medical man of any sagacity will see the necessity of yielding to prejudices for the attainment of objects directed to the relief of his patient. If the practitioner determine to add opium to the stupe, he should give the patient the advantage, whatever it may be, of its efficient application, which is, perhaps, obtained in a neater and more perfect manner by the addition of a drachm of the tincture, or a few grains of the watery extract to a pint of hot water.

Whatever difference of opinion may exist with respect to the extent to which stimulating or astringent applications should be employed in the inflammatory stage of conjunctival inflammation, there is little doubt entertained of the value of astringents in the chronic stage, or that condition of the conjunctiva which may be considered the necessary consequence of the violent inflammation above described. The salts most commonly used for this purpose are acetate of lead, alum, sulphate of copper, sulphate of zinc, corrosive sublimate, and nitrate of silver. Notwithstanding the length of time these salts have been in use, it does not appear that any conclusive experiments have been made to ascertain their comparative value, or the best proportions in which they should be used. The practitioner has little more to guide him in the selection than the vague and uncertain evidence of expressions of confidence in some one or other by different practical writers. The most generally valuable, safe, and efficient, are the acetate of lead, alum, and nitrate of silver, the sulphates of copper and zinc being more stimulating and irritating, with less astringent properties. Weak solutions, however, of sulphate of zinc or copper are unquestionably of value in the slighter vascularity of the conjunctiva following catarrhal ophthalmia, or arising without preceding inflammatory action. Saturated solutions of acetate of lead or alum may be used with the greatest safety, and without producing any such effect as follows the introduction of other salts. Saturated solutions of sulphate of zinc may also be applied to the conjunctiva without any other destructive consequence than a temporary increase of vascularity, pain, and weeping; but a saturated solution of sulphate of copper produces violent inflammation, probably acting chemically, and producing superficial destruction of the surface. Nitrate of silver, in the proportion of ten or fifteen grains to the ounce, appears also to act chemically, causing whiteness of the vascular conjunctiva, but without the irritating and stimulating effects of sulphate of copper. Nitrate of silver, even in the proportion of three or four grains to the ounce, if used for a month or six weeks, will produce an olive-coloured indelible stain of the conjunctiva, and lamentable deformity; or both it and acetate of lead, applied while ulcers of the cornea exist, produce the worst form of opacity by being decomposed by the tears and deposited on the flocculent surface, and there detained until permanently fastened by cicatrization, as has been described by the author of this article in the Dublin Hospital Reports. None of these disadvantages attend the application of the alum solution, and its powerfully astringent qualities are undeniable. The condition of the conjunctiva to which the reader's attention is called with reference to these applications, is that which exists from a fortnight to six weeks after the first attack, when the acute inflammatory symptoms have subsided, and before the membrane has acquired the extreme condition of disorganization denominated granular conjunctiva. In this state a solution of from five to ten grains of nitrate of silver in an ounce of water, or the ointment recommended by Mr. Guthrie, will prove of great advantage; but the practitioner should not allow the praises exclusively bestowed upon it to induce him to discard the saturated solutions of alum or acetate of lead, as he may be assured that they will often be found preferable in practice, although the particular condition in which they are so may not have been ascertained. The effects of the saturated solution of acetate of lead, when such cases, modified by scrofula, are accompanied by vascularity of the conjunctiva covering the cornea, are frequently most remarkable. Dr. Vetch expresses the following opinion respecting the solution of acetate of lead. "The liquor plumbi acetatis in its undiluted state is the application which I can recommend as the most efficacious, and at the same time incapable of doing harm in this, and in every stage of purulent ophthalmia. The sensation it occasions is that of some dust or sand having got into the eye, which lasts from ten to twenty minutes; there is generally a copious lachrymation, and the eye afterwards feels cool, and the sight is clear."

Whichever of these solutions is preferred should be fairly dropped into the eye, after it has been cleansed with sponge and warm water, on awaking in the morning, and the patient should remain quiet with the lids closed for half an hour. This may be repeated in the evening, if not found to produce increase of pain or irritation, and the patient should be allowed a weaker solution to wash the eyes with more frequently in the course of the day. At night the edges of the lids may be smeared with cream, fresh butter, or some mild ointment. On the continent a compound salt, called the *lapis divinus*, is much used; it is made

by heating eight ounces of nitre, alum, and sulphate of copper in a crucible, and, when fluid, adding half an ounce of camphor, and closing the vessel until cold. It is used in the proportion of three or four grains to the ounce and appears to have the same effect as the sulphate of copper.

The application of the vinous tincture of opium was first recommended by Mr. Ware, in his "Remarks on the Ophthalmy." He gives the following account of the method of applying it, and its effects: "I would particularly recommend the thebaic tincture of the old London Dispensatory; a medicine composed of opium and warm aromatics, dissolved in mountain wine." "When first applied, it causes a sharp pain, accompanied with a copious flow of tears, which continues a few minutes, and gradually abates, after which a greater and remarkable degree of ease generally succeeds. The inflammation is often visibly abated by only one application of this tincture; and many bad cases have been completely cured by it in less than a fortnight, after every other kind of remedy had been used for weeks, and sometimes months, without any success. But this speedy good effect is not to be expected in all cases indiscriminately. In some, the amendment is more slow and gradual, requiring the tincture to be made use of for a much longer time; and a few instances have occurred, in which no relief was at all obtained from its first application. In cases of the latter kind, in which the complaint is generally recent, the eyes appear shining and glossy, and feel exquisite pain from the rays of light. However, notwithstanding these symptoms, the application is sometimes found to succeed; and whether it will or not, can only be determined by making the trial, which is attended with no other inconvenience than the momentary pain it gives. When it is found to produce no good effect, the use of it must be suspended, until evacuations and other proper means have diminished the excessive irritation; after which it may again be applied, and bids equally fair for success, as in those instances in which it never disagreed. If two or three drops of the thebaic tincture are dropped at once on the globe of the eye, the pain they occasion will be considerably greater than if they are placed in the inner angles of the eyelids, and made to glide gradually on the eye, by gently drawing down the lower lid. At the same time that this latter mode of applying the tincture is much less painful than the former, I have found, in a great variety of cases, that it is equally beneficial." Experience has fully established the character here given by Mr. Ware of the vinum opii; it is, however, most applicable in those cases where there is much scalding pain, lachrymation, and intolerance of light.

If the pulpy villous vascularity produced by the inflammation above described be neglected, or be not removed by the applications alluded to, it degenerates, in about six weeks or two months, into a still more destructive condition; the conjunctiva lining the lids acquiring a rough irregular vascular appearance, which, from its resemblance to the granulating surface of a sore, has been named the granular conjunctiva. This condition, if not altered or removed, is followed by red vascularity and opacity of the conjunctiva covering the cornea, and almost total loss of vision. To remove this state of the membrane, the resources of ophthalmic surgery have been nearly exhausted, and frequently without effect. It even unfortunately happens that the destruction or removal of these warty prominences or granulations is not followed by recovery. In fact, the organization of the conjunctiva is destroyed by the severe inflammation, and, if ever restored, requires a great length of time to return to its original condition. These granulations may be removed either by the knife or escharotics, and the question respecting the preference to be given to either method has been the subject of much controversy. They certainly may be shaved off by the dexterous use of a small scimeter-bladed knife, and their removal in this way is accompanied by the advantage of local bleeding, and consequently less subsequent pain, irritation, and inflammation, than attends the use of escharotics. The partial use of escharotics, however, is often necessary to complete the removal, as it is impossible to reach all the granulated surface with the knife. The escharotics commonly employed are the nitrate of silver, or sulphate of copper, in substance. The former is preferable, its effect is more decisive, and the inflammation and irritation, from its application, are less: the latter is, however, preferred by some.

The operation of applying the escharotic must not be carelessly performed. Much mischief has been frequently done by allowing an inexperienced pupil to rub the inside of the lids with a piece of sulphate of copper in a slovenly manner. The upper lid should be everted, and the surface dried with a cambric handkerchief; the whole of the granulations should then be repeatedly touched with a pencil of nitrate of silver until the surface becomes of a deep ash colour; it should then be carefully washed with a plentiful stream of water from a syringe, lest any particle of nitrate of silver should adhere undecomposed, and be turned in on the cornea. If the sulphate of copper be used, it will require a more continued application to produce the escharotic effect, and the washing must be performed with equal care. The application of the escharotic must be repeated as often as the granulations are observed to remain after the surface becomes clear from casting off the coat produced by the nitrate of silver.

[In chronic granular ophthalmia, Dr. Hays (see his edition of *Lawrence on Diseases of the Eye*, p. 267, Philad. 1843,) has found a saturated solution of the chloride of sodium contribute more to the cure than any other application. When the eye is irritable, with injection of the conjunctiva of the ball and lachrymation, he knows of no remedy that effects such prompt and marked relief.]

Ointments are frequently resorted to for the removal of the vascularity and tenderness of the lids, produced by purulent ophthalmia, especially where the skin at its meeting with the conjunctiva becomes red and destitute of cuticle, constituting lippitudo, a condition which, it is to be recollected, arises often without preceding acute inflammation. Where the object is merely to obviate the inconvenience arising from the dryness produced by exposure to the air, or the scalding from contact of the tears, it may be accomplished by the appli-

cation of a little cream, fresh unsalted butter, or the spermaccti ointment. It is often, however, necessary to combine astringent or stimulating ingredients with the ointment. The ointment of nitrate of mercury, diluted with five or six times its weight of oil or lard, is very commonly used, and frequently with good effect, if continued for a few days only. The stimulating effect appears to be salutary as a first and temporary impression, but when persevered in for a length of time, seems to have a contrary result. The ointment of oxyd of zinc is a very safe and efficient astringent application, as is also the mixture known as the ophthalmic ointment of *Janin*, composed of four drachms of lard, two of tutty or impure oxyd of zinc, two of Armenian bole, and one of calomel. These ointments should, however, be made with such a proportion of oil as will give them so soft a consistence that they can be applied with ease to the lids with the point of the finger or a camel-hair pencil; they should also be properly and carefully ground on a flag with a muller, not merely mixed on a tile with a palate-knife, and great care taken that the oily ingredient be not rancid or burned. Ointment of acetate of lead, or a mixture of oil or lard, with liquor subacetatis plumbi, is another application frequently employed with advantage. As oily applications are sometimes found not to agree with the surface, the practitioner may find it necessary to combine astringents with some tenacious ingredient of a different description; for this purpose, clarified honey may be used, with the addition of alum or Armenian bole, finely levigated. Honey alone will often afford relief in the slighter degrees of vascularity following conjunctival inflammation.

In the treatment of purulent ophthalmia the advantages to be derived from blisters should not be overlooked. The extent to which they may prove beneficial in any particular case can perhaps scarcely be ascertained; but as their value generally in contributing to the removal of local inflammation is admitted, it is not reasonable to disregard such a resource. These may be applied at any period of the disease, but they probably are more efficacious after the more acute symptoms have subsided, or before they have set in, and appear most indicated where there is much irritability, intolerance of light, and scalding lachrymation. They should not be applied too near the eye, as in such case the cutaneous inflammation sometimes spreads to the lids and increases the mischief. A patch of the scalp from the temple to the top of the ear should be shaved, and a blister of size sufficient to secure a decided counter-irritating effect, applied and allowed to remain on until the skin is fully inflamed. A scrap of blister behind the ear does not produce sufficient impression to compensate for the annoyance it occasions to the patient.

Gonorrhœal Inflammation of the Conjunctiva.—Mr. Lawrence, from whose valuable work on venereal diseases of the eye it will be necessary to make copious extracts in treating this subject, considers that there are two varieties of gonorrhœal inflammation of the conjunctiva, the acute and mild. The acute gonorrhœal ophthalmia is perhaps to be considered specifically distinct from the common severe purulent ophthalmia, on account of its origin and consequences, rather than from any decided difference in the character and symptoms of the disease. There is the same scalding pain, intense vascular chemosis, profuse purulent discharge, sloughing, abscess, and ulcer of the cornea, and permanent disorganization or granulation of the conjunctiva, observed in the Egyptian and other severe forms of purulent ophthalmia. Mr. Lawrence says, "the local symptoms are not sufficient to establish a distinction between this affection and common purulent inflammation of the most violent kind, and its peculiar nature is indicated by the concomitant circumstances, that is, by the preceding or existing gonorrhœa." He considers, however, that it generally attacks only one eye, while common purulent ophthalmia affects both; that it commences in the conjunctiva of the eyeball oftener than in that of the lids, that the symptoms are more violent, and that its progress is more rapid.

Notwithstanding the similarity of symptoms between the severe purulent and the gonorrhœal ophthalmia, a repetition of the account of those symptoms as they occur in the latter in the words of Mr. Lawrence may not be unacceptable. "There is the greatest degree of vascular congestion, the most intense and general external redness; excessive tumefaction of the conjunctiva; great chemosis, with corresponding swelling of the palpebræ; and profuse yellow discharge. In the first stage of the disease, which is short, the inflammation is confined to the conjunctiva, and is attended with soreness and stiffness, with the sensation of sand or dirt in the eye, and with more or less uneasiness on exposure to light or using the organ. The affection soon extends to the cornea, with severe and agonizing pain in the globe, orbit, and head, augmented to intolerable suffering on exposure to light, and with febrile disturbance of the system of inflammatory character. The danger to the organ is now most serious and imminent; and indeed, when the disease has thus advanced from the mucous membrane to the globe itself, we can hardly expect by any kind of treatment to avert entirely its destructive consequences. The violent inflammation, which causes the yellow puriform discharge from the mucous surface of the conjunctiva, produces effusion into the cellular texture connecting it to the surrounding parts. Hence the general swelling of the membrane, and that more considerable tumefaction on the front of the sclerotic, round the cornea, which is called chemosis. The latter is often so considerable that the swelled conjunctiva overlaps the cornea all round, so as nearly to hide it. Similar effusion takes place into the cellular texture of the eyelids, enlarging them considerably, more particularly the upper, which hangs over and completely covers the lower. The palpebral swelling is sometimes œdematous, with the integuments but little redder than natural; in other instances it is firmer, with the skin, particularly of the upper eyelid, bright red. The latter state denotes more active inflammation, and greater danger to the organ. The chemosis and the swelling of the lids make it often difficult, and sometimes impossible, to get a clear view of the cornea. Although it is desirable to do this, in reference to prognosis, when we first see the case,

we should not persist in our efforts at the risk of augmenting the inflammation or the patient's sufferings. The œdema of the eyelids declines in the progress of the affection, and then one or both of them may become everted, the convex edge of the tarsal cartilage being pushed forwards by the swollen conjunctiva. The inflamed membrane exhales at first a thin whitish mucus in small quantity; as the inflammation proceeds to its full development, the discharge becomes thicker, yellow, and abundant; the yellow tint and the quantity of the exhalation being in proportion to the violence of the inflammation. When the latter is at its height, the discharge closely resembles in its appearance, and in the stain communicated to linen, that which proceeds from the urethra in venereal gonorrhœa. Although the pain is generally most severe both in the eye and in the head, as in other instances where the dense and unyielding texture of the cornea is the seat of inflammation, and although patients often complain of burning pain, of tension, as if the eye would burst, of deep-seated and intense agony, with extension of these distressing and almost intolerable sensations to the brow, forehead, and head generally, there are some instances in which little or no pain is experienced. The symptoms of acute gonorrhœal ophthalmia are not equally violent through the whole course of the affection: it begins with swelling and increased redness of the conjunctiva, and some pain in the organ: then the puriform discharge takes place, with increased uneasiness: and, lastly, the inflammation extends to the cornea, with great aggravation of suffering. Thus the course of the affection may be divided into three stages, of which the limits cannot be marked very accurately. In the first there is vascular distension and swelling of the membrane, with swelling of the lids; the commencement of the second is marked by the occurrence of the puriform discharge, and that of the third by extension of the inflammation to the cornea. The duration of each of these varies in different instances according to the constitution and state of health of the individual, and perhaps still more according to the nature of the treatment adopted. This variety, however, is observed less in the first and second than in the third stage; the two former, and more particularly the first, usually passing off very rapidly."

In gonorrhœal ophthalmia, the immediate destructive effects of the inflammation, sloughing, abscess, and ulceration of the cornea, are more to be apprehended than in common purulent ophthalmia as it now occurs. The appearance of the cornea when about to slough or suppurate has been already described; the process, as it occurs in the present form of inflammation, is described as follows by Mr. Lawrence. "The cornea becomes dull and hazy before it sloughs, or indeed before undergoing any of the changes above enumerated. Its transparency and polish are completely destroyed where it has sloughed; and it is converted into a dirty yellowish or brownish opaque surface, which is immediately recognised as deprived of life. At first it looks like a portion of wetted leather; it is soon separated from the living parts, when it has a loose, soft, and ragged appearance. As the lens and capsule which are exposed by this separation are transparent, the patient sometimes recovers for a short period tolerably good vision. After the slough is detached, the chambers of the aqueous humour may be exposed by ulceration; the humour will then escape, the empty coats will collapse, and the globe remains permanently shrunk in the socket. More commonly, although the whole cornea seems to slough, the entire thickness does not separate, and the anterior chamber is not exposed." The slough of the cornea, when it does cast off, leaves an ulcerated surface proportioned to the size of the slough, with or without an opening into the anterior chamber. If the slough or ulcer does not extend through the thickness of the cornea, the consequence is simple opacity or staphyloma; if it does not penetrate into the chamber of aqueous humour, the iris passes through the opening, and the patient suffers from closed, contracted, or irregular pupil in addition to the opacity. But it is not by slough alone that these evils are produced: suppuration or abscess is liable to occur. It is thus described by Mr. Lawrence: "Suppuration of the cornea may be general or partial: it is usually the former. The cornea first becomes white, and then assumes a yellow colour. The effused substance is not a fluid, nor is it collected into a cavity: it is a thick viscid matter deposited in the texture of the cornea. Ulceration takes place, and exposes an opaque yellow substance, which looks like ordinary matter, but it cannot be wiped off." The abscess of the cornea thus opened by progressive suppuration goes on to ulceration, and may extend to the anterior chamber as in the sloughing process, and with similar consequences. The successive changes in the ulcer are thus described. "If the ulcer should be spreading, the inflammation remaining unchecked, its surface is whitish and ragged or flocculent, or of a dirty yellowish cast with surrounding haziness. When the inflammation subsides, it becomes transparent. The commencement of the restorative process is marked by the surface of the excavation assuming a light greyish tint with a jelly-like appearance. A soft semi-opaque substance fills up the breach, when the surface becomes smooth, and the regular figure of the cornea is restored."

The *prognosis* in gonorrhœal ophthalmia must obviously be most cautious, and the patient should at once be informed respecting the nature of his disease, and the dangers to be apprehended. The first and most destructive consequence to be feared is the sloughing of the cornea; a change of appearance in the eye indicative of such disorganization is therefore to be watched for with great attention. This change is a haziness, or loss of the natural transparency of the cornea, proceeding rapidly to complete dirty white opacity, subsequently becoming total or partial slough, with edges defined by the suppurative process, which separates dead from living parts. The appearance of abscess is later than that of slough, but, when observed even in the slightest degree, should be viewed with nearly equal apprehension, as it is impossible to determine the extent to which it may enlarge either in depth or breadth, while in the state of abscess or that of ulcer. After the more acute period has passed over without either slough or abscess, the appearance of even a small

speck of ulceration is also calculated to excite alarm, as it is often most difficult to arrest the progress of this process before it produces irreparable injury of the organ. After the patient is relieved from apprehension respecting these destructive consequences, he should still be taught to understand that his recovery is to be slow and even doubtful; the change of organization in the conjunctiva, and its conversion into the peculiar granulated condition, with permanent red vascularity of the conjunctiva of the eye-ball and opaque cornea, may still prevent recovery; or even without such disorganization, the cure may be greatly retarded by the influence of scrofulous constitution or the local disease. Mr. Lawrence says, "of the fourteen cases which I have related, loss of vision took place in nine from sloughing, suppuration, or opacity of the cornea. In two of these one eye was lost, and the other recovered. Sight was restored in the other five, with partial opacity of the cornea, and anterior adhesion of the iris in three of the number. So short a period intervenes between the commencement and the full development of the complaint, that in many instances irreparable mischief is done to the eye before our assistance is required. If we see the complaint in the first or second stage, we may expect to arrest its progress by active treatment; but success does not invariably attend our efforts. Our prognosis will principally turn on the state of the cornea; if that should possess its natural clearness, the eye may be saved. If it should become hazy and dull, and more particularly if it should have assumed a white nebulous appearance, consequences more or less serious will inevitably ensue. Great swelling of the conjunctiva, more particularly great chemosis, profuse discharge of a yellow colour, and bright redness of the swollen upper eye-lid, are unfavourable circumstances, as indicating a high degree of inflammation. When both eyes are attacked in succession, the disease is less severe in the second, which, therefore, is usually saved. Sometimes, however, the inflammation is equally violent in both."

In investigating the **Causes** of gonorrhœal ophthalmia, inquiries highly interesting, even in a general point of view, are suggested. It has been supposed that the specific form of gonorrhœal inflammation existing in the urethra is transferred to the conjunctiva by that obscure and inexplicable transition which is denominated metastasis, respecting which we know little more than the fact of its occurrence. This metastasis never has, and perhaps never can be proved to occur, because there can be little doubt that the contact of gonorrhœal matter with the conjunctiva produces the disease of the eye, and it is impossible to prove positively that such contact does not take place in all cases of gonorrhœal ophthalmia. Every individual affected with gonorrhœa must have the fingers contaminated by the discharge, notwithstanding the most scrupulous cleanliness and care; and the application of the fingers to the eyes for the removal of any irritation there is so habitual, that it becomes an involuntary act, which nothing but continued watchfulness could prevent, and which may occur even during sleep when the patient is unconscious of it. It is true that a person may be so attentive to the prevention of this occurrence, by the utmost precaution and cleanliness, as to render it highly improbable that a particle of matter has been applied to the eye; but the attendant can only say in such case, this is most probably metastasis of gonorrhœa to the eye, but cannot safely assert positively that it is so. While it appears thus impossible to say with certainty that metastasis has occurred, it is equally impossible to prove that it has not; and many facts and arguments may be adduced in favour of the conclusion that this is the mode in which the disease originates.

The disease of gonorrhœa affords other apparent examples of metastasis. The violent inflammation of the testicle produced by suppression of the discharge from the urethra is surely rather of this character than an extension of the mucous inflammation along the lengthened and tortuous tube of the vas deferens. Irritable bladder, produced by the same cause, is also most probably independent of a continuous extension of the specific inflammation along the whole length of the urethra to the lining membrane of that organ; and even sympathetic buboe generally presents characters so different from that which arises from the extension of irritation along the absorbents to the lymphatic glands from simple injury, that it is not unreasonable to attribute it to metastasis. These metastases are of comparatively rare occurrence; so is gonorrhœal ophthalmia, notwithstanding the probability of the frequent application of the matter to the conjunctiva or its vicinity. The occurrence of the disease in one eye without extending to the other, notwithstanding the profuse discharge so likely to come in contact with the unaffected organ, makes it highly probable that the disease depends on a cause different from mere contact of infectious matter. Whatever doubt may be entertained respecting the occurrence of metastasis, evidence sufficient to prove that the disease can be produced by the contact of gonorrhœal matter, both in the individual labouring under the disease of the urethra as well as others, is on record. Mr. Lawrence, Mr. Wardrop, M. Delpech, Mr. Bacot, and others, state instances in which there could be no doubt of the fact. The writer of this has had this assigned as the cause of the disease by a young man, who without any leading question or knowledge of the usual production of inflammation of the eye by such a cause, stated circumstantially the fact of gonorrhœal matter having been projected into his eye while retracting the prepuce, which confined a quantity of the discharge. Dr. Vetch details a solitary case in which the experiment was made to determine this matter by an hospital assistant; and where gonorrhœal matter was applied to the conjunctiva with impunity. It does not, however, appear that Dr. Vetch himself conducted the experiment; and it is obvious that much confidence could not be reposed in the accuracy of an individual so imprudent and thoughtless as to incur such a risk. While it may be admitted that the contact of gonorrhœal matter to the eye produces conjunctival inflammation, it is by no means proved that it uniformly has this effect. Some individuals may possess this dangerous susceptibility, and others not; and even the same individual may at one time suffer

from the contamination, and at another time not. Should it be established by observation that this is the fact, it would be an important illustration of the general question of contagion, proving that a morbid poison directly applied to a circumscribed spot produces effects at one time and on one person, which are not observed on other persons or on different occasions. Upon a candid consideration of this subject, it must be admitted that it is the duty of the practitioner to warn patients labouring under gonorrhœa, of the danger they incur by negligence or inattention, with respect to the precaution necessary to prevent the communication of the disease to the eye.

With respect to the **Treatment** of gonorrhœal inflammation, it is scarcely necessary to observe that the plans suggested for the relief of common severe purulent ophthalmia should be carried into effect with the utmost vigour. Mr. Lawrence observes, in alluding to the advantage of depletion: "The only chance of arresting this violent disorder, and preserving the eye from its destructive effects, is afforded by the boldest antiphlogistic treatment, particularly by the freest abstraction of blood, locally and generally. We must bleed largely from the arm, and take blood by cupping on the temples, or by numerous leeches applied round the part; and these measures must be repeated at short intervals, until the vascular congestion is relieved and the attendant pain removed. The other parts of the antiphlogistic treatment must be combined with the free abstraction of blood; but our great reliance must be placed on the latter. I think that as much blood should be taken from the arm as will flow from the vein; and that the evacuation should be repeated as soon as the state of the circulation will allow us to get more." Mr. Bacot and Mr. Wardrop concur in the opinion respecting the value of depletion. Mr. Guthrie, on the contrary, places little confidence in its effects, and relies upon the application of the ointment of nitrate of silver, as administered in severe purulent ophthalmia. He even attributes the loss of the organ in this disease to inordinate bleeding: he says—"The history of all cases of this disease, hitherto recorded, is but a melancholy story of lost eyes. The reason of this loss is, that they all pursued a similar plan of treatment; viz., they invariably bled the patient to a very large quantity; one hundred, one hundred and fifty, and even two hundred ounces, are stated as having been drawn, until the patients were blanched as white as a sheet, or a piece of white wax. This was accompanied by a due proportion of purgatives, emetics, and emollient fomentations, with mild, astringent lotions and leeches, until in time the eye or eyes were lost, and the case was brought to a conclusion. As long as I followed this course I fared no better than those around me, but successive failures led me at last, almost in despair, to adopt a very opposite method, which has proved, at least in my hands, much more effective, and will, I trust, in those of others, remove the opprobrium which has been attached to this part of surgery." He then proceeds to describe the mode of application of the ointment of nitrate of silver formerly alluded to, and observes, "I do not mean to say that one application will alter the action, and restore the parts to a healthy state; it must be re-applied; neither is the ointment to do every thing; it may, and must, of course, occasionally fail." These conflicting opinions may perhaps be reconciled. Bleeding is undoubtedly a resource of the utmost value and importance in the general treatment of gonorrhœal ophthalmia, and the ointment recommended by Mr. Guthrie is an application also of value. The practitioner will therefore avail himself of both, as circumstances require. Even Mr. Guthrie, relying as he does on the stimulating astringent, recommends moderate bleeding in conjunction with it; and in the application of the nitrate of silver ointment in common, severe purulent ophthalmia, enjoins venesection as an accompaniment. It is certain that a coarse, brawny, plethoric, carnivorous man must be freely bled to save his eyes from destruction in this complaint; while a similar practice adopted towards a pallid, languid, feeble individual, would prove at least inefficient, if not injurious. The experienced practitioner will, therefore, proportion his efforts to the resistance, and adjust his treatment to each case according to its symptoms.

It is unnecessary to repeat the observations respecting the treatment of severe purulent ophthalmia, except to remind the reader that they are equally applicable to the form of disease under consideration. It is obvious, however, from the specific character of the gonorrhœal inflammation, that mercury, from its influence on disease at least allied to this, deserves more consideration as a remedy in this than the common form. It is, however, notorious, that whatever necessity the practitioner may see for the administration of mercury to correct the mischief to be apprehended from the specific disease, he cannot rely upon it to cut short the inflammation. Mr. Lawrence says—"I have seen both the ordinary purulent and gonorrhœal opthalmia proceeding apparently unchecked under the full mercurial action." Some practitioners, however, place reliance on this remedy, and some, assuming as a matter of course that it ought to cure the disease, administer it in every instance. The writer of this, considering that mercury is a poison which should not be introduced into the system without absolute necessity, and positive evidence of its beneficial effect in correcting morbid action, feels no inclination to recommend its administration in gonorrhœal ophthalmia.

On the supposition that this disease depends on metastasis, and relying on the unproved assumption that it is accompanied by a suppression of the discharge from the urethra, it has been proposed to reproduce that discharge by irritating or stimulating that passage. This resource has been recommended by the German writers in particular, who have perhaps weakened the confidence reposed in their opinions by practical men in this country, by their proneness to mould practice on preconceived theories and unauthenticated facts, as well as by their reliance on antiquated doctrines, authorities, and nostrums. There is no evidence before the profession to prove, either that the discharge from the urethra ceases with the appearance of the ophthalmia, or that, if it does, its restoration removes the affection of the eye. Mr. Lawrence observes, after quoting the authority of Richter, Scarpa, and Beer, as to the expediency of reproducing the urethral discharge, "In spite

of the confidence which one is inclined to repose in the practical knowledge and judgment of those whose advice has just been quoted, I cannot help thinking that the measures in question have been recommended rather on theoretical grounds than from experience. At least these writers do not mention any results of their own practice; nor have I met with any cases in which the employment of such means is mentioned. In none of the instances which have come under my own observation has the gonorrhœal discharge been suppressed, so that the reason for this kind of practice has not existed. Again, when the violence and rapidity of the disease are considered, in contrast with the slowness and uncertain operation of this treatment, we cannot doubt that irreparable injury would be done to the organ during the time lost in such attempts.

Purulent Ophthalmia of Infants.—This is a most formidable disease; indeed it is probable that the loss of vision from this cause is four times greater than that from all the cases of common purulent and gonorrhœal ophthalmia put together. It is particularly necessary that the young practitioner, especially the accoucheur, should be aware of this, because some writers describe the complaint as trivial, and its treatment as attended with little difficulty. This opinion has probably arisen from the circumstance of the frequent occurrence of a very mild form of conjunctival inflammation in new-born infants, unattended by any destructive consequences, and generally disappearing without medical aid. The disease now under consideration presents all the characters of the severest purulent ophthalmia. The vascularity is enormous, but in consequence of the organization of the parts, and the yielding of the texture of the lids at this early period of life, there is less of chemosis than general tumefaction of the coverings of the eye. The pain, if a judgment may be formed from the extent of the inflammation and the sufferings of the infant, is very great. The purulent discharge is as profuse as in the worst forms of common severe purulent or gonorrhœal ophthalmia. The consequences are equally formidable; and destruction or injury of the organ by slough, abscess, and ulcer of the cornea, prolapse of the iris, staphyloma, or escape of the contents of the eye-ball, equally to be dreaded. There is one consequence, however, most destructive in purulent ophthalmia in adults, not encountered here; this is the permanent alteration in the structure of the conjunctiva, proceeding to red vascularity of the transparent part of the membrane, and granular lids. The escape from this description of disorganization, of such frequent occurrence at more advanced periods of life, arises probably from the high degree of vital energy and active operation of the functions of growth and nutrition existing at this period.

The disease generally commences within the first three days after birth. The eye first appears moister than natural; redness of the lids ensues; a small quantity of purulent matter collects in the inner canthus; the white of the eye is slightly bloodshot; and the child shuns the light and becomes restless and peevish. All these symptoms are speedily aggravated; the vascularity becomes intense, causing tumefaction of the lids externally, and a pulpy villous condition of them internally; but the redness of the conjunctiva over the ball seldom extends to chemosis. The purulent discharge becomes profuse, completely glueing up the lids during sleep, and often accumulating beneath them in such quantity as materially to increase the distress; and when the eyes are drawn asunder, it so completely fills the space between the lids as to prevent the observer from obtaining a view of the cornea: it accumulates with such rapidity, that if completely washed away with a syringe, it is replaced by a fresh secretion in ten minutes or a quarter of an hour. The discharge is usually of the colour of common purulent matter, but is sometimes tinged with blood; or if the child be jaundiced, has a greenish tint. When the infant cries, the tumefaction of the lids increases enormously, and sometimes they become everted, exposing the red vascular surface to the air. This is the period at which the sloughing process takes place; it is well described by Mr. Saunders in his Treatise on Diseases of the Eye, published after his death by Dr. Farre. His words are quoted here because they are obviously those of an accurate observer enjoying ample opportunity of acquiring correct information; and because they are the observations of the man who first applied the sound principles of Hunterian or English surgery to the investigation of ophthalmic diseases. He says, "As the disease advances, the cornea becomes more or less cloudy, and by the extent of this cloudiness the degree of approaching slough is marked: for the whole of the cornea, if the whole become cloudy, will ultimately slough, and the form of the eye be totally destroyed. I do not mean to say that in every instance in which opacity of the cornea is apparent, the cornea is about to pass into a sloughy state; on the contrary, opacity is often the mark of a healthy action, commencing around the breach of the cornea, for the purpose of restoring the part, and ought to be hailed as a happy omen. I am now speaking of a peculiar duskiness of the cornea, which begins during the progressive state of the inflammation, which is antecedent to any loss of substance, but is indeed a sure sign that such loss is about to take place. When this duskiness comes on, supposing only a portion of the cornea about to slough, the extent of it in the space of twenty-four hours becomes definite; in the same space of time it becomes elevated and apparently lessened in extent; a groove or fissure forms between it and the rest of the cornea, portions of it are carried off by the discharge and tears, or sometimes it separates altogether in one mass. I have several times washed out with a syringe these little sloughs entire. But although I am as certain of the fact as the most frequent observation can make me, I am equally sure that most commonly when this disease destroys vision, the destruction is accomplished in a more gradual manner, not by a slough of very considerable extent and through the whole depth of the cornea at once, but by a succession of sloughs. In other words, the ulcer left by the casting off of the dead piece of cornea becomes in turn sloughy, and extends itself by a succession of sloughy surfaces, until the last lamina of the cornea sloughs, or being protruded by the pressure from within, ulcerates, and the

aqueous humour escaping, the iris passes through the breach of the cornea. Already the whole surface of the eye has been in an ill-conditioned inflammation; the ulcer, or rather the surface of the cornea, around the protruding iris is indisposed to heal, so that more and more of the iris protrudes; this in turn ulcerates, and the crystalline and vitreous humours all issue at the orifice. That the inflammation itself immediately destroys the parts by sloughing or ulceration is a truth of which I am perfectly convinced."

Mr. Mackenzie, in his treatise on Diseases of the Eye, observes with respect to these opinions of Mr. Saunders, "It is scarcely necessary to spend time in refuting Mr. Saunders's notion of its being an erysipelatous inflammation. His opinion regarding the mode in which the cornea is destroyed in this disease appears of more importance and equally incorrect. He maintains that it is by sloughing, not by suppuration and ulceration, that the destruction of the cornea is effected. The opportunities which I have had of watching the progress of the affection of the cornea have convinced me of the contrary. Onyx or infiltration of pus between the lamellæ of the cornea is the uniform harbinger of destruction; the lamellæ exterior to the pus give way by ulceration; the ulcer spreads and deepens till the cornea is penetrated, and often almost altogether destroyed. Any thing like mortification or sloughing I have never seen. The coming away of the purulent infiltration exposed by ulceration must have given rise to Mr. Saunders's notion of successive slough."

Whether the inflammation be erysipelatous or not may be ascertained when pathologists have determined what the term erysipelatous so applied means. If the cornea ever sloughs in severe inflammation of the conjunctiva, it may be admitted that it does so in this, especially if men of experience agree that such is the case. Mr. Mackenzie is undoubtedly right in stating that the eye is lost in this disease frequently by abscess; and the fact perhaps is, that the two processes are often combined; the dirty ragged ulcer consisting of open abscess with sloughy surface, and being very much of the character of anthrax. Whatever opinion may be entertained respecting the precise nature of the destructive process, the practitioner should never lose sight of the danger to be apprehended from it. It commences during the active period of the inflammation, but continues after it is mitigated, and, if not arrested, terminates in destruction of the organ.

The investigation of the *causes* of purulent ophthalmia in infants is not attended with much difficulty. It may readily be admitted that the exposure of the infant to cold, immediately after its expulsion from the uterus, will probably produce inflammation of this description; and to this cause may reasonably be attributed the frequency of a milder form of conjunctival inflammation at this time of life, which does not assume the violent character of the other. The resemblance between this severe form and Egyptian or gonorrhœal ophthalmia justifies the suspicion that it is of equally distinct specific character, and to be traced to a cause equally peculiar. This cause may be the application of the matter of leucorrhœa or gonorrhœa to the eyes during labour. The extent to which this cause operates, however, has not been fully ascertained, and the proof of its influence exists more upon conjecture and reasonable inference than actual practical evidence. The practitioner knows, from daily observation, that women labouring under leucorrhœa and even gonorrhœa produce children unaffected by this disease; but he should be equally aware that in the majority of cases of purulent ophthalmia the mother labours under one of them. The accoucheur should, therefore, make himself acquainted with the truth as to this matter, and direct that a sponge and basin of warm water be ready to cleanse the face and eyes of the infant immediately after birth, and if possible before the lids are opened. If it be known that the mother labours under gonorrhœa, the practitioner should watch the approach of inflammatory action in the first three or four days after birth, and immediately resort to those vigorous measures already enumerated to arrest its progress. These precautions may possibly be superfluous, and disregarded or neglected in the common routine of extensive practice; but if one child be preserved from blindness by them in the course of a practitioner's life, it is sufficient return for the trouble.

The **Prognosis** in this purulent ophthalmia is a matter of considerable importance to the professional welfare of the practitioner. In consequence of the frequent occurrence of the mild form of the disease, those who have not experienced the destructive effects of the other are liable to overlook its approach, and allow the process of slough or abscess to proceed without interruption. As soon as the disease has appeared in the virulent form above described, the parents should at once be informed that it is liable to terminate in serious injury or destruction of the organ. Persons of the lower order, unprovided with medical assistance at their confinement, generally allow the disease to proceed without interruption during the period at which any hope could be entertained of averting the destructive consequences. They seldom seek relief until a week or fortnight after the first attack, and then in consequence of not finding the purulent discharge and tumefaction subsiding, as they were led to expect. When an infant, at this period of the complaint, is presented to the practitioner, he should at once satisfy himself whether the cornea be safe from slough, abscess, or ulceration, or, as this is attended with some trouble, if leisure does not permit him to do so, he should inform the parent in plain and intelligible language, that there is danger to be apprehended, and that the child may have its vision impaired or destroyed by opacities of the cornea, which cannot at the moment be perfectly distinguished. If he dismisses the patient without this precaution, or if he makes any application to the eye without explicitly announcing the extent of the injury, the reproach of having blinded the child will be fastened on him by those who, from culpable negligence, ignorant confidence in their own opinions, or sordid love of money, had caused so lamentable a misfortune. If, upon examination in this after period of the disease, the cornea be found perfectly clear and free from ulcer of any kind, the practitioner may entertain sanguine hopes of perfect recovery, but he should not even then give ex

pression to these hopes, as relapse may occur, or some accidental circumstance interfere with the cure. If slough, abscess, or ulcer have not taken place in the first week or ten days, there is every reason, from experience, to expect that no further bad consequence is to be apprehended than the troublesome and distressing vascularity with profuse purulent discharge, which often, especially if not checked by astringents, continues for six weeks or more. It has already been observed that the high degree of vascularity which accompanies this disease does not degenerate into permanent disorganization of the conjunctiva with opaque cornea and granular eyelids; at least this is the result of the experience of the writer of this article: further observation may, however, enable others to correct or modify this assertion.

To the **Treatment** of purulent ophthalmia in infants, the principles laid down respecting the other severe forms of conjunctival inflammation are applicable. As soon as the existence of the disease is fully ascertained, a leech should be applied over the cheek-bone at the edge of the orbit, and blood allowed to flow until the effect of the bleeding becomes obvious by the paleness or sickness of the infant. One or two leeches, at most, on each side, are sufficient for this purpose; and as all the effects of general bleeding are produced by the application of leeches at the earlier periods of life, and as the flow of blood does not usually cease spontaneously in infants, on account of the great vascularity of the skin, the medical attendant should not lose sight of his patient until he has secured such arrangements as will prevent the possibility of the child's life being endangered by hemorrhage. It is on this account that the leeches should be applied on the cheek-bone at the edge of the orbit, where, from the resistance of the bone beneath, circumscribed pressure may be made without delay. The bowels should be emptied completely; and for this purpose a grain of calomel, with castor oil or any other purgative to which the practitioner may be partial, may deserve a preference. If it be admitted that the administration of calomel influences the biliary secretion, its use is particularly indicated at this period of life, when the liver performs an office in the animal economy of still greater importance than it does at more advanced periods. If the child continue to suck voraciously, it may be desirable to rid the stomach occasionally of the accumulated milk by the administration of a small quantity of ipecacuanha or other emetic medicine. As soon as the purulent discharge becomes profuse, care must be taken to prevent it from accumulating with the tears beneath the lids, and producing by mechanical distension an increase of the irritation and distress. This accumulation is frequently produced by the eyes becoming sealed up by the evaporation of the fluid part of the discharge which has collected on the outside of the lids. To prevent it, the eyes should be perpetually sponged gently with lukewarm water, and by laying a scrap of old linen squeezed out of warm water over the eyes as the infant lies on its back in bed. The edges of the lids may be touched with a little cream when the child settles for a longer sleep, and when it awakes the lids should be gently drawn open, and the accumulated matter forced out by light pressure and motion of them. Repeated syringing of the eye is unnecessary, and is often injurious by adding to the irritation: the purulent discharge causes no mischief but by its bulk producing distension in the way above stated, and is probably the best, being the most natural, protection of the surface against the contact of the tears. When the practitioner makes his visit, it is, however, necessary to wash away the discharge completely, in order to obtain a perfect view of the cornea; this may be done with a syringe, for which purpose a neat silver one with a fine orifice should be used; but as this may not be at hand, and as many may not wish to run the risk of spattering the discharge into their own eyes, a more simple and equally efficacious method may be adopted: the infant's head being laid on the knees of the operator while the body is supported by the nurse, the eyes should be well sponged externally, and the lids drawn open and closed repeatedly, so as to extricate the discharge, which should again be removed with the sponge. After the child ceases to cry, a few drops of warm water should be allowed to flow into the eye between the lids out of a large camel-hair pencil, and the lids opened and pressed as before, after which the child should be, if possible, set asleep, and then the eyes being suddenly drawn open, a full view of the cornea may be obtained.

Local applications may be resorted to with two objects—the alteration of the nature of the inflammatory action altogether, or the diminution and removal of the purulent discharge. For the former object, the nitrate of silver is recommended, and it cannot be denied that it may effect it; but it must at the same time be confessed that the practice has not yet been fully submitted to the test of experience. The question for consideration is, whether a practitioner, as soon as he has ascertained beyond doubt the existence of this severe form of inflammation, can with safety, and a fair prospect of advantage, introduce a solution of nitrate of silver of ten grains to the ounce, or an ointment of ten grains to the drachm, between the lids. That this and other astringents may be used with success to put a stop to the purulent discharge, after the first symptoms of inflammatory action have been subdued, cannot be doubted. With this view, a five-grain solution of nitrate of silver, or saturated solutions of acetate of lead or alum, may be resorted to: the acetate of lead cannot, however, be employed if slough or ulcer be present. A large drop of saturated solution of alum may be put into the eye once or twice in the twenty-four hours, and the nurse may be allowed a weaker solution of four or five grains to the ounce to use occasionally. Mr. Mackenzie recommends a solution of one grain of corrosive sublimate, in an ounce of water, as a wash to be freely used.

If slough or abscess has taken place, it does not appear that any other than the plan of treatment above stated can be adopted, or that any local application can be made likely to suspend the progress of either one or the other. Mr. Saunders, reasoning on the fact that bark and other tonics are employed with advantage in gangrene, and that the slough of the cornea is of this character, directed the administration of extract of cinchona in such cases. It does not, however, appear that

the cases are analogous, or that the remedy does actually prove of advantage. The slough, or abscess, is, in the present case, a consequence of intense inflammatory action, not followed by any diminution of vital action, locally or generally, consequently not requiring remedies intended to invigorate the constitution, or accelerate the functions of circulation and nutrition. The suggestion of Mr. Saunders does not appear to have been much acted upon in general practice. After the slough of the cornea has been cast off, or the abscess completely converted into healthy ulcer, or if the iris be prolapsed and has assumed a red, granulating appearance, the greatest service the practitioner can afford his patient is, to prevent any injudicious interference with the natural processes of reparation which are in progress.

Scrofulous Ophthalmia.—The consideration of what is called scrofulous ophthalmia need not detain the reader long, if it be admitted that there is no inflammatory affection of the eye which displays at its onset such characters as entitle it to be considered specifically distinct. In fact, there does not appear to be any such disease, strictly speaking, and what is commonly called scrofulous ophthalmia is nothing more than the modification of any of the preceding forms of conjunctival inflammation by that condition of constitution which we denominate scrofulous. There can be no doubt that every one of the preceding forms of inflammation, and indeed every form of inflammation of the eye, is liable to assume the scrofulous character, except the purulent ophthalmia of children, which is not so modified in consequence of the organization of the system at that time of life.

The symptoms considered characteristic of scrofulous ophthalmia do not present themselves for some time after the first attack, and when the inflammatory period has subsided, and the chronic stage fairly set in: then it is that the progress to recovery is interrupted; the conjunctiva does not return to its natural condition; light becomes painful; the tears flow copiously; the purulent discharge is diminished; and the continued vascularity causes opacity of, and extension of red vessels to, the conjunctiva of the cornea; [and, according to Dr. Taylor, (Tweedie's *Library of Medicine*, 2d Amer. edit., ii. 145, Philad. 1842,) towards evening, especially after sunset, considerable remission of the symptoms takes place, which had been aggravated through the day: a phenomenon which, according to him, is not observed in any of the other forms of ophthalmia.] To correct this destructive condition, the obvious resource is in those means universally admitted to exercise a salutary influence on the functions of circulation, secretion and nutrition. They may be summed up in a few words: respiration of a pure atmosphere, warm clothing, generous diet, bark and other tonics, warm, salt-water baths, and bathing in the open sea. It is in this condition of the eye that the chronic vascularity may be most effectually removed by the daily application of a saturated solution of acetate of lead, or the aqua lythargyri acetati dropped between the lids night and morning. It is also in this modification of the chronic vascularity, with great intolerance of light and profuse scalding lachrymation, that the vinous tincture of opium affords most relief. Blisterings, which may be resorted to in any of the preceding forms of inflammation, appear particularly serviceable here, and should be repeated as often as they heal, either on the temples, at some distance from the eye, or behind the ears. Free exposure of the eyes and face to the air and light is an important part of the treatment, although a part generally neglected or actually interdicted. There can be little doubt that the miserable condition in which neglected or mismanaged children are frequently found, with the face scalded with tears, the head averted, and crying or sneezing on exposure to light, is produced by confinement to a dark, close room, and covering the eye with a green shade.

Arthur Jacob.

[It has been recommended recently by Dr. Hocker, and by Mr. Wormald, (*Lond. Lancet*, Nov. 19, 1842, p. 285,) to apply the solid nitrate of silver to the eyelids. A clean stick of the nitrate, having from one to two inches exposed, is selected; the patient's eyelids are closed, and put slightly on the stretch, by applying the thumb of the left hand to the eyebrow, and gently raising the skin; the nitrate, moistened, is then to be passed over the whole surface of the skin of the upper, and, subsequently, of the lower eyelid, two or three times, smoothly, and without much pressure, bringing not the point but the sides of the stick in contact with the skin. The object is only to blacken, not to occasion any severer effects. In this manner, it is affirmed, the sensibility of the fifth pair of nerves is diminished, and the lachrymation and photophobia are relieved. Similarly good effects are stated by Dr. Furnival, (*London Lancet*, Dec. 10, 1842, p. 405,) to result from painting the palpebræ of the affected eye with the tincture of iodine, pure or diluted.

Variolous Inflammation of the Conjunctiva.—Variolous pustules may form on the conjunctiva, as upon any portion of the cutaneous surface. In the opinion of some, however, the eye suffers in small-pox from common inflammation merely, although of a very severe form. The pustule appears, at first, as a small white point, which gradually becomes elevated and yellow; and in spite of every care, if the pustule be over the cornea, vision may either be wholly lost, or impaired by opacity or ulceration. Where suppuration or sloughing of the cornea occurs, it may be followed by the various lesions of the eye-ball, more than once referred to. At times, *secondary variolous ophthalmia* occurs at the time when the pustules are disappearing from other parts of the body. It is milder than the variolous conjunctivitis just described, but may be attended with mischief. It seldom, however, terminates in destruction of the cornea. Opacities are much more likely to be left. The period of the attack varies from two to six weeks, after the apparent termination of the primary complaint.

The **Treatment** is the same as in all severe cases of ophthalmitis. General bleeding may be required, or, if not, it may be advisable to take blood locally. When pustules form, they should be opened early, and be cauterized with the solid nitrate of silver. The same application is advisable when they burst.

The secondary form of variolous inflammation

may require topical bleeding and cathartics, in the first instance; but afterwards an opposite course is generally advisable, and the sulphate of quinia alone, or associated with other tonics, may be indicated. Vinum opii and a solution of nitrate of silver, or the solid nitrate of silver, are amongst the best topical applications.

Inflammation may also attack other parts of the eye.

Inflammation of the Sclerotica.—Inflammation of the sclerotic coat of the eye does not often exist alone; being either accompanied, from the first, or speedily followed, by conjunctivitis. The iris and cornea suffer to a certain extent, although, unless from neglect or mismanagement, serious alteration of structure in either is not common.

Diagnosis.—There is a general bright redness of the globe of the eye, especially around the cornea, towards the margin of which the radiated vessels of the sclerotica are seen advancing, and, along with those derived from the conjunctiva, passing over the cornea to the extent of about half a line, forming a fine vascular wreath, which encircles the cornea wholly or in part, and in which all the vessels are observed to terminate with sharp points, and at an equal height: none pass beyond it, the rest of the cornea remaining free. This arrangement and mode of termination of the vessels has been considered, by Jüngken, characteristic of *rheumatic sclerotitis.*

In the progress of the inflammation, the iris becomes implicated, as indicated by contraction of the pupil, easily seen by comparing the sound with the affected eye: the iris, also, is less active than usual. The capsule of the aqueous humour is affected, giving occasion to haziness of the cornea. The pain of the eye-ball is severe, and of a stinging or darting character, extending to the orbit, forehead, cheek, and occasionally along the branches of the fifth pair of nerves to the face. The pain is usually increased by warmth, and is especially severe from sunset to sunrise.

There is always, along with those symptoms, a considerable secretion from the eye; but, instead of its being mucous, as in inflammation of the conjunctiva, it consists of the secretion from the lachrymal gland. Photophobia or intolerance of light is always present, but it varies in degree in different cases. The same may be said of the constitutional irritation: fever almost always exists, but, at times, to a much greater degree than at others.

The inflammation is often restricted to one eye, and frequently alternates with rheumatic affections in other parts of the body. It also leaves a strong predisposition to recurrence on the application of slight causes.

The disease is not often seen in children and old persons.

Treatment.—The treatment of sclerotitis should be active, especially if the patient be plethoric, and there be much constitutional irritation. Blood may have to be taken from the general system, and the operation may be repeated again and again, unless the symptoms are relieved. Cupping and leeches and blisters may also be used, as in the forms of ophthalmia already considered. Cathartics may be prescribed as revellents, and calomel and opium be administered, so as to touch the mouth gently.

In regard to local applications, they should generally be used warm. They may consist simply of warm water, or warm milk and water; or warm decoction of poppy-heads. Warm opiate frictions have been advised to the temple and forehead, with the view of averting, or relieving, the nocturnal paroxysm of pain. Warm laudanum, or warm wine of opium, may be used for this purpose, or a liniment of soap with opium. It has been advised, that these opiate frictions should be used especially about an hour previous to the expected attack.

Applications to the eye, in the form of collyria, have not been found of much service, and those that are excitant are injurious during the early stages. When, however, the acute symptoms have passed away, and *à fortiori* when they become chronic, vinum opii—pure, or diluted—dropped between the eyelids, is often beneficial. In such cases, too, especially when they are associated with evidences of a strumous diathesis, tonics, as sulphate of quinia, or arsenic, may be successfully administered.

Throughout the whole course of the disease, the iris should be kept under the influence of belladonna.

At times, the catarrhal and the rheumatic varieties of ophthalmia are combined, constituting *catarrho-rheumatic ophthalmia;* the presence of which may be diagnosticated, from a knowledge of the functional phenomena exhibited by the two varieties respectively. The cornea is very liable to suffer in this form of ophthalmia from ulceration, abscess, or interstitial deposition; or the inflammation may extend to the iris, so as to terminate in the effusion of lymph, and in obliteration of the pupil.

More activity of treatment is required than in sclerotitis; and in addition to the remedies advised under the latter affection, the employment of the local agents recommended in the catarrhal variety is demanded.

Inflammation of the Cornea.—Inflammation of the cornea is apt to form a part, by extension, of the different forms of inflammation of the eye, that have already received attention. Ceratitis proper, however, commences in the cornea, whence it may spread so as to attain other tissues. In many cases, it is simple, as where it has been caused by any extraneous substance, as a particle of metal imbedded in the substance of the cornea; or, what is considered by some to be more common, it originates frequently in the scrofulous diathesis, and has been thought to merit the distinctive appellation of *strumous corneitis.*

Diagnosis.—The disease generally commences slowly, and insidiously, and the cornea loses its natural brilliancy, and becomes dull and hazy,—the surface appearing as if covered with fine dust, or resembling glass that has been breathed upon; and, at a later period of the disease, it seems studded with minute depressions. The fine vessels of the conjunctiva and sclerotica become injected;—those of the sclerotica, which is the principal seat of increased vascularity, being arranged in radii around the cornea, and presenting a carmine hue: occasionally, too, the

vessels are so numerous over the corneal epidermis, as to form a vascular network, which covers the entire surface, and has been termed *pannus*. The pain attending inflammation of the cornea, may be acute in the early stage, and be accompanied by photophobia and by lachrymation. As in other cases, too, it may come on in paroxysms. In the chronic stage, it is not violent; often, indeed, it is slight.

The terminations may be like those of other forms of ophthalmia,—for example, interstitial deposition; ulceration; protrusion of the iris; obliteration of the pupil; immobility of the iris; adhesion of the iris to the cornea, &c. &c.

In all cases, the prognosis ought to be guarded; yet, division of the membrane by the knife generally heals without any inconvenience, as in the operation for cataract by extraction; and in cases of penetrating and other wounds of the cornea, we often see surprising recoveries.

Treatment.—In this there is nothing peculiar. The general management, advised under simple and strumous inflammation of the conjunctiva, is equally appropriate here. Full antiphlogistic measures may be required in the acute stage; but it must be borne in mind, that the inflammation is apt to pass into the chronic form; when revellents—as blisters behind the ears, occasional cupping on the nape of the neck, and mercury administered so as to produce a revellent impression on the mouth, with or without tonics, as the case may seem to require, will be most serviceable. The internal use of the oleum terebinthinæ, (gtt. xx.—xxx. ter die,) has been found serviceable in the strumous form.

Where the ceratitis is of some standing, it is commonly accompanied by increased secretion of the aqueous humour, so that the cornea becomes more convex than natural. In such case, it has been proposed to evacuate the humour by puncturing the cornea, with the view of relieving the painful sense of distension; and it is said to have been practised with advantage by several practitioners.

Sulphate of quinia, in conjunction with collyria of nitrate of silver or sulphate of zinc, according to Dr. Littell, (*A Manual of the Diseases of the Eye*, p. 123, Philad. 1837,) evinces frequently a remarkable control over vascular albugo, or that form of the disease which is characterized by lymphatic deposition.

Inflammation of the Iris.—The iris may be inflamed in consequence of the extension of inflammation from other parts of the eye, but it may be inflamed also idiopathically; and again, the inflammation may be modified according to syphilitic, arthritic, or other complications. Hence, various divisions of iritis have been made; but these are scarcely necessary, inasmuch as they are indicated only by a knowledge of the history of the case, or a careful examination of the patient.

Diagnosis.—Inflammation of the iris, whatever may be its cause or complication, presents certain phenomena, some of which belong to itself; others are common to it and to other forms of ophthalmia.

Those that belong to the iris are loss of its usual brilliancy, and change of colour. This change is the result of a combination of the natural colour of the iris with red blood, red blood and yellow lymph mixed, or yellow lymph alone.

If the inflammation be seated in the serous covering of the iris—*Iritis serosa*—the colour is not changed, but is modified by the appearance of a pale grayish coat, which gives a dull aspect to the membrane. In serous iritis, consequently, a blue iris may remain blue; but the colour is rendered dull. The structure of the iris also exhibits change; its fibrous texture is no longer observable, and tubercles or abscesses may form in its substance. It also loses its contractility, so that the pupil remains unchanged in size when exposed to different degrees of light, and is generally contracted.

Along with these pathognomonic symptoms are many which belong both to it and to other inflammations of the eye. Thus, there is zonular redness of the sclerotica, produced by numerous vessels surrounding the cornea, and running towards its edge: adhesions may also form between the iris at its pupillary margin, and the capsule of the crystalline; and, in rare cases, it adheres to the posterior surface of the cornea, and more or less plastic lymph is effused into the anterior or posterior chamber of the eye, or into both, giving rise to imperfection of vision, and, at times, to total blindness. Photophobia, lachrymation, and deep-seated circumorbital pain, generally aggravated at night, are present to a greater or less degree, according to the severity of the inflammation. The constitutional disturbance is often very considerable, and the symptoms proceed at times so rapidly, that vision is destroyed in a few days.

Such are the main phenomena of iritis, whatever may be the cause or complication.

Causes.—Along with mechanical injuries, and other agencies concerned in the production of ophthalmia in general, may be reckoned,—a constitutional predisposition given by syphilis and scrofula, and, perhaps also by gout and rheumatism; hence we have, in many works,—*acute idiopathic iritis*, *syphilitic iritis*, *rheumatic iritis*, *arthritic iritis* and *strumous iritis*, as so many subdivisions.

Treatment.—The first object in a case of iritis is to subdue the inflammatory action, and prevent the effusion of lymph. General bloodletting should be prescribed immediately, and be repeated according to circumstances; blood may, at the same time, be taken from the nape of the neck by cupping; and, along with this, cathartics, nauseating doses of tartrate of antimony and potassa, and the whole antiphlogistic treatment and regimen advised under the most acute forms of ophthalmia already considered, must be directed. Where the disease is less severe, and the constitution of the individual such as to render it advisable to be cautious in the abstraction of blood from the general system, cupping may be trusted to, along with the general management and regimen already inculcated.

The most approved method of treatment—after bloodletting has been practised—is to administer mercury so as to induce a revellent influence on the system, under which effusions of plastic lymph are prevented,—or removed, if they already exist.

℞.—Hydrarg. chlorid. mit. gr. xij.
Opii. pulv. gr. iij.
Glycyrrhiz. pulv. ℈ss.
Confect. rosæ. q. s. ut fiant pil. xij.
Dose, one, every four hours.

The effect upon the system is sufficiently evidenced by its *touching* the mouth. In some cases, in which full salivation supervened, it appears, according to Dr. Taylor, (*Tweedie's Library of Medicine*, 2d Amer. edit. ii. 162, Philad. 1842,) to have acted like a charm. Still, so many inconveniences are induced by ptyalism from mercury, that the remedy should not be pushed to this extent, if the disease will yield without it; and especial care should be taken on this head, if the iritis be accompanied by a strumous constitution. In such case, mercury may still be demanded, but it should be administered if possible so as only to affect the constitution gently, and its agency be kept up for a length of time. Should salivation supervene in any form of iritis, no farther good can, of course, result from the mercury, until its effects have subsided.

To relieve the circumorbital pain, frictions with any of the liniments recommended in the other forms of ophthalmia may be had recourse to. An ointment, combining a mercurial with an opiate, has been strongly recommended.

Collyria are of little or no benefit; and the various counter-irritants, employed in ophthalmia, are of service only after bloodletting has been actively premised. Oil of turpentine has been extolled as an internal revellent, where mercury is inadmissible.

To prevent contraction of the pupil, extract of belladonna may be smeared over the eyebrow once in twenty-four hours, or a filtered aqueous solution may be dropped on the conjunctiva. When cautiously employed, it gradually elongates the filaments of lymph that have formed between the iris and the capsule of the lens; and, with this view, its use may have to be continued for months.

In the iritis, which occurs in a constitution contaminated by the syphilitic poison, as well as in the other forms referred to,—the same general principles of treatment apply, and but slight modification is necessary. In the rheumatic, arthritic, strumous, and more chronic forms of idiopathic iritis, sulphate of quinia is often beneficial, but it should not interfere with the other appropriate remedies, and especially with calomel and opium.

Inflammation of the Choroid.—As an accompaniment of inflammation of other parts of the eye, choroiditis has been admitted by all writers on the subject; but it has not been described by all as an independent disease.

Diagnosis.—The following have been depicted as the functional phenomena of inflammation of the choroid. One of the earliest symptoms is the formation of a blue zone around the cornea: this is produced by thinning of the sclerotica, which is succeeded by the protrusion of small tumours of a dark bluish colour, varying in size, number and position; a watery effusion forms gradually between the choroid and the retina, which produces absorption of the vitreous humour, and compresses the retina into a cord-like substance, simulating the appearance of deep-seated cataract or malignant tumour of the optic nerve. The pupil is often altered in shape, the iris immovable, and the cornea opaque; these symptoms arising from the simultaneous inflammation of those various parts. Enlargement of the globe of the eye likewise results at times, and morbid changes, which may render the extirpation of the organ necessary. There is always more or less pain and intolerance of light; but the constitutional symptoms are generally inconsiderable.

Causes.—Of these we know little. It is a disease of the adult age, and is said to be more frequent in females than in males, and especially in those of a strumous habit.

Treatment.—This does not vary from that recommended in iritis. Mercury does not, however, seem to be decidedly beneficial. After active depletion, tonics, as sulphate of quinia, have been found of great benefit, and as the disease frequently occurs in strumous habits, their use is generally indicated. The arsenite of potassa (*Liq. potass. arsenit.* gtt. v.—viij. ter die) has been advised by Mackenzie: (*Practical Treatise on Diseases of the Eye*, 3d edit., 1840.) The morbid appearances in the advanced stage, it is affirmed, have disappeared under its use, and health and vision have been restored simultaneously.

When the eye-ball is tense and painful, and there is a tendency to choroid staphyloma, puncturing the sclerotica and choroid, so as to evacuate the contained fluid, has afforded relief.

Inflammation of the Retina.—This is an uncommon affection, except as an accompaniment of other forms of ophthalmia.

Diagnosis.—As the retina cannot be seen, the existence of retinitis has to be inferred from disturbance of function. The intolerance of light is great; shining spectra, of various kinds, are seen, and there is a gradual impairment of vision; the iris is motionless, and the pupil greatly contracted, whilst the whole globe is highly sensible to the slightest touch or movement. These symptoms are usually accompanied by deep-seated pain in the globe of the eye, which extends to the eyebrow, and is often very severe, and accompanied by symptoms of cephalitis. When the disease is acute, the febrile excitement is often very great.

Extensive disorganization of the internal structures of the eye-ball is a common result; and purulent effusion sometimes takes place, which may augment to such a degree that the cornea gives way, the pus is discharged, and the eye-ball collapses.

Acute inflammation of the retina is less seen than the chronic form, which is characterized by intolerance of light, of different degrees; impaired vision, with ocular spectra, and, ultimately, by immobility of the iris. It has been considered one of the most common causes of amaurosis, and requires the revellent treatment recommended under that disease.

Robley Dunglison.]

OSSIFICATION. See Tissues, Adventitious.

OTALGIA and OTITIS, (from οὖς, *auris*, gen. ὠτὸς, and ἀλγέω, *doleo*.) Ear-ach; pain in the ear. The ear-ach, which on all occasions results from a morbid congestion of some part of the organ of hearing, cannot be intelligibly explained

without first considering the affections of which it is a symptom; and as the diseases of the ear have not yet been spoken of in this work, it is proposed to give a concise account of them in the present article.

Until the publication in 1821 of the admirable *Treatise on the Ear*, by M. Itard, of Paris, physician to the Royal Institution for the Deaf and Dumb, the profession was in a deplorable state of ignorance respecting the pathology of this organ; an ignorance which has been lamented by every author who has taken up or happened to allude to the subject. The situation of the organ deep in the skull, the intricacy of its general structure, the minuteness of its various parts, added to the difficulty of tracing them in their bony case, and the supposed obscurity and unmanageable nature of its diseases, have all contributed to deter professional men from bestowing their attention, as well upon the anatomy as upon the pathology of the ear; and the consequence is a deplorable want of knowledge on these subjects. This is the less excusable, since the work of Itard affords a very complete and masterly account, not only of the diseases, but of the anatomy and physiology of the organ. Itard, indeed, whose treatise cannot be too highly praised, has done for the organ of hearing what the illustrious Laennec has done for the organs of respiration: and yet so little known in this country are the labours of this author, that in a small volume just now published on "The Organ of Hearing," we do not find the name of Itard quoted. The writer's attention was particularly called to the ear many years since by the occurrence of cases of chronic disease of the tympanum producing a purulent discharge from the external meatus, penetrating the skull, and destroying the individuals by disorganization of the brain. Subsequent experience has only tended to confirm the interesting and important nature of the subject; and it is with some degree of confidence, therefore, that we invite the members of the profession to study this department of pathology. We can assure them that the path which may appear intricate and impracticable, is so only because it is untrodden and unfrequented.

The diseases of the ear may be conveniently arranged, according to the anatomical division of the organ, into those which are seated respectively in the external, the middle, and the internal parts of the ear.

The diseases of the middle ear are the ordinary cause of otalgia, strictly so called; on which account, as well as because they are the most frequent and formidable, we shall enter upon the consideration of them in the first place.

1. The middle ear comprehends the cavity of the tympanum, with its contained chain of ossicula, its proper membrana tympani and its dependencies, the mastoid cells and Eustachian tube; all which parts, lined with a mucous membrane, present an extensive continuous surface, apt to be involved in the affections of the tympanum. Of the five openings leading to and from the tympanum, three are closed, the fenestra ovalis and fenestra rotunda by their proper membranes, the large opening to the external meatus by the membrana tympani; while the other two are open, the one leading to the Eustachian tube, the other to the mastoid cells,—which cells, forming as they do a cul-de-sac, leave the Eustachian tube the only open channel of communication with the tympanum from without. Hence it happens that in inflammation of this cavity, it and the mastoid cells become filled with the usual product of inflammation of a mucous membrane, a muco-purulent effusion, which has no means of exit, because the Eustachian tube, the only channel by which it could escape, is involved in the inflammation and closed by it. In this manner the delicate fabric of the ear is exposed to the pressure and other bad effects resulting from matter confined in a close cavity; and hence arise ulcerative perforation of the membrana tympani, puriform discharge from the meatus externus, destruction of the organ by caries, and eventually cerebral abscess and death.

The inflammation of the cavity of the tympanum, like the inflammations of the other parts of the body, may be intense, or it may be subacute.

a. The subacute internal otitis is an affair of common occurrence, and constitutes the pathological condition of nearly all of those cases which pass under the denomination of ear-ach. The patient complains of pain in the ear, perhaps of the head in some degree, accompanied with singing noises and dulness of hearing. There may be a slight impairment of the appetite, which appears to arise rather from the pain than from any febrile movement, the sanguiferous system and the organic functions scarcely sympathizing in this affection. In the corresponding side of the head there is a susceptibility to the impression of a cold atmosphere, which induces the patient to wrap up the head; with this precaution he is content to bear the pain for several days, when it usually subsides, leaving the sense of hearing less acute for a short period; after which the organ soon recovers itself, and the affair is ended.

b. Very opposite to this are the symptoms, progress, and termination of the acute internal otitis, or intense inflammation of the tympanum. This inflammation is characterized by an intense, acute, unremitting pain, deep-seated in the ear, attended with loud, clanging, metallic noises, the pain affecting the whole head, but in an especial manner the side corresponding with the seat of the inflammation. As the inflammation attains its height, so does the pain in the ear become distracting, and excites nocturnal delirium; and with this dreadful pain is a sense of violent distension, as if the part were on the point of bursting. The pain of the head is proportionably aggravated, and attended with heaviness and weight. The face manifests great anxiety and distress; the constitution sympathizes deeply, but the character of this sympathy is less marked by the high febrile movement which usually accompanies inflammation, than by great general exhaustion, the effect of continued pain. The pulse is frequent, but not remarkable for fulness or strength, nor is there much increase of heat; nevertheless all the organic functions are troubled, and the tongue is furred, the taste vitiated, and the appetite lost.

This state of things having persisted for twenty-four or thirty-six hours, the inflammation begins to decline, the pain to diminish in intensity, and the metallic noises change to a violent hissing;

the sense of distention and of bursting continues though in a less degree, but the delirum passes away, and the pain and uneasy sensations of the head gradually subside. The taste and appetite return quickly, and the patient is soon convalescent; though the hissing in the ear and the sense of distension and bursting are troublesome for two or three weeks, and various noises are perceived occasionally for some months. The organ, however, recovers its proper function, but slowly; the patient experiencing an indistinctness of hearing, often of sight, for a considerable period.

Such is the happiest termination of an acute inflammation of the middle ear.

Instead of this termination in resolution, if the violent symptoms, present at the height of the inflammation, do not abate, the sense of distension increases to a most painful degree, the general headach continues urgent, and the delirium manifests itself at times by day as well as at night, and in the course of two or three days matter is observed to discharge from the ear. In this case the cavity of the tympanum has become filled by a puriform fluid, the product of the inflammation, which has effected a passage by ulceration through the membrana tympani, and is discharging itself by this channel.

Should the perforation of the tympanum be large, and the discharge free and copious, then the fever and other urgent symptoms quickly subside, and a chronic puriform discharge, the *otorrhœa purulenta*, is established. Should the perforation be small and the discharge trifling, it proves insufficient to relieve the sufferings of the patient; the distressing signs of matter confined in the middle ear continue; and now it becomes the duty of the practitioner to recommend an operation to enlarge the opening in the membrana tympani. If a free outlet is thus accomplished, complete relief is afforded; the puriform discharge becomes abundant; and, as in the former case, an otorrhœa is established.

The establishment of the purulent otorrhœa is not always preceded by a form of inflammation so acute as that described; it is often brought about gradually by a subacute otitis of a chronic kind, in which case the symptoms are less severe, are more confined to the ear itself, and the perforation of the membrana tympani is slowly effected. This consecutive affection deserves further notice.

[It may happen, that the abscess, when it breaks, is discharged through the Eustachian tube into the throat. According to one observer, M. Itard (*Mém. de l'Académ. Royal de Méd.*, tom. v. fasc. iv. Paris, 1836,) this occurs in about one case in ten. The patient feels the pus passing down the tube, and ejects it at times in considerable quantity.

The lining membrane of the cavity of the tympanum is fibro-mucous,—or at once a mucous membrane, and a periosteum; and it has been observed, that the membrane has been the seat of a blennorrhœal inflammation in its outer layer, and of a more violent inflammation, like the one described above, in its inner layer. In the former case, the mucus may be secreted in such quantity as to impede the entrance of air through the Eustachian tube into the middle ear, and thus cause deafness. Where the mucus exists in any quantity in the middle ear, it may be detected by catheterism of the Eustachian tube, which has, accordingly, been employed not only in the way of diagnosis, but of therapeutics. Air *douches* are used for this purpose by means of an apparatus, which the writer has described elsewhere; different sounds being rendered according to the precise condition of the cavity. (Deleau, *Sur le Catheterisme de la Trompe d'Eustache*, Paris, 1828: Itard, *Op. cit.*: Kramer, *On Diseases of the Ear*, Amer. Med. Lib. edit. Philad. 1838; or the writer's *New Remedies*, 4th edit. p. 366, Philad. 1843.]

Otorrhœa Purulenta, a purulent discharge from the external meatus, may arise from some disease of the meatus itself as a porriginous affection of the lining membrane of the tube; in this case the affection is of little importance. The otorrhœa about to be described proceeds from the middle ear, is the result of a suppurative inflammation of the tympanum with perforation of the membrana tympani, and is a very serious complaint. Inflammations of the tympanum having terminated in suppuration, and the matter having worked itself an outlet, it may be reasonably supposed that all diseased action would subside and cease; and such, no doubt, would be the favourable issue, were it not that, from the peculiar conformation of the organ, part of the matter is retained in the cavity of the tympanum and mastoid cells, and thus becomes a cause of extensive mischief.

The opening of the Eustachian tube being situated at the anterior and internal angle of the floor of the tympanum, may appear to offer a natural and depending outlet to the retained matter; but this channel is either closed altogether or much obstructed by its lining membrane having been involved in the inflammation; and although a free outlet may have been formed by the perforation of the membrana tympani, yet some matter is still retained in the cavity and in the mastoid cells. It is retained in the latter because they form a blind irregular cavity; and in the tympanum because of the peculiar form of the meatus externus, which being arched, and having the crown of the arch on a level with the middle of the tympanum, resists rather than favours the spontaneous emptying of the cavity. Under these circumstances the matter lodges in the tympanum as in a well, and gives rise to a train of formidable symptoms which constitute the second stage of the disease.

The perforation of the membrana tympani giving access to the air, the retained matter undergoes decomposition, becomes highly irritating, and induces ulceration of the lining membrane of the tympanum and mastoid cells; the osseous structure is now exposed to the influence of this irritating matter, and a carious disorganization commences. The insidious advance of the caries is indicated by a dull pain seated principally in the region of the middle ear, but diffusing itself over the corresponding side of the head, by the sense of hearing being blunted, and by a dull and rather vacant expression of the countenance.

The disorganization proceeds more rapidly in the mastoid cells than in the tympanum, because of their less compact structure, and is made apparent by the mastoid process becoming tender on

pressure, and the integuments puffy and vascular; by-and-bye the perforation of the bone is completed, and an abscess manifests itself behind the ear. The point where the carious perforation happens is usually at the anterior part of the groove which gives origin to the digastric muscle. The abscess does not burst readily, but extends itself upwards behind the ear, the soft parts offering less resistance in this direction; examples, however, occur, in which the abscess directs itself downwards under the sterno-mastoideus when it points low in the neck; it never extends backwards, because of the resistance of the digastric and trachelo-mastoid muscles and of the deep cervical fascia.

The caries of the mastoid cells is not limited to this outward direction, but extends on every side, and next affects the posterior wall of the cells, and perforates the petrous portion of the temporal bone which forms the fossa of the lateral sinus: the bone is here naturally thin, and, when carious, presents a worm-eaten appearance. Through these carious perforations the matter penetrates, and by irritating and detaching the dura mater, gives rise to decided cerebral symptoms. The same process sometimes goes on in the roof of the mastoid cells formed by the superior surface of the petrous portion; but the bone being here thicker is less easily perforated. Should the patient still live, the caries will destroy the chain of ossicula in the tympanum, and they will be discharged through the external meatus; eventually the caries will ravage the whole internal ear, destroying the membranes which close the fenestra ovalis and the fenestra rotunda, and disorganizing the vestibule, semicircular canals, and scalæ of the cochlea. In this way all the sinuosities and cavities and bony fabric of the ear are broken down and confounded together, and the interior of the petrous portion and of the mastoid process of the temporal bone presents one large carious excavation.

To such an extent did the disorganization proceed in the case of a child two years and a half old, that the entire labyrinth, consisting of the semicircular canals and cochlea, was discharged by the meatus externus. In this instance the course of the disease was marked by the various stages of inflammation of the internal ear, succeeded by the chronic puriform discharge, by the dislodgement and evacuation of the ossicula of the tympanum, and, lastly, by the coming away of the labyrinth itself through the meatus externus, occupying in the whole a period of several months. (This case is detailed more at length in Mr. Tod's work on the "Organ of Hearing," p. 134.)

In the course of the devastation above described, the portio dura becomes also involved, and the disorganization of this nerve gives rise to neuralgic pains, convulsive twitchings, and paralysis of the muscles of the corresponding side of the face.

At the period when, in the progressive caries of the temporal bone, the dura mater becomes exposed to the irritation of the corrupt secretion from the ear, the membrane inflames and suppurates, and becomes detached by the matter burrowing between it and the skull; the patient is then sometimes carried off at once by meningitis, or the destructive process may proceed and induce ulceration of the dura mater and other membranes, and, finally, of the brain itself. The ulceration of the brain may be superficial, or may penetrate deep into its substance and form a suppurating cavity, having the aspect of an abscess, which will in some cases occupy the whole of the middle lobe of the corresponding hemisphere, or the corresponding lobe of the cerebellum.

While the disease is confined to the ear, the sympathetic pain in the head radiating from this organ is the most marked symptom; but as soon as the membranes of the brain become involved, the cerebral signs predominate and obscure the original disease. The patient, who probably hitherto has been in the hands of the aurist, is now transferred to the care of the physician, who, finding the signs of cerebral disease marked and decided, will often fail to trace them back to the ear as their origin, and therefore regards the case as an idiopathic cerebral affection. Nor is the error always cleared up by dissection, because the morbid appearances in the brain present a satisfactory cause for the violent symptoms and fatal termination, and the caries of the temporal bone, which is less conspicuous on the cerebral surface, either escapes notice, or is concluded to be the effect of the cerebral disease. This, we are persuaded, is no uncommon case, having ourselves seen it happen to persons much accustomed to morbid dissection.

The slow carious disorganization of the ear may be a work of many years before it reaches the brain, during which period the puriform discharge from the external meatus varies much in quantity, particularly if the Eustachian tube is not altogether closed, the discharge being at one time profuse by the meatus externus, at another taking place by the tube into the throat. This latter effect is manifested by an offensive dark matter being mixed with the sputa, and which, collecting in the pharynx during sleep, is hawked up in the morning in considerable quantity. At times the discharge is suppressed, as when the patient takes cold in the ear; then otalgia supervenes, with headach and more or less of sympathetic fever, all which signs are relieved by a return of the discharge. Attacks of this nature are frequent.

The gradual disorganization is seldom attended with dangerous symptoms, so long as it is confined to the ear; but the moment it has reached the membranes of the brain, pain in the head becomes the prevailing symptom, and it is no longer referred to the ear as its cause. If now, from any accidental cause, the otorrhœa is suppressed, the patient experiences an inflammation of the membranes of the brain more or less severe; [*Cerebral Otorrhœa.*] The more extensive the disorganization, the more severe is the attack, and the more dangerous. Some patients survive many such attacks, and die exhausted by long suffering, while others are cut off by the attack which supervenes on the disease first penetrating to the dura mater. In this case, dissection will discover traces of inflammation of the detached membrane, with a little pus effused between it and the skull. A sympathetic but fatal inflammation of the membranes of the brain may occur at the period of the formation of the external abscess at the root of the

mastoid process, of which we have seen an example.

It is at one of these periods of the supervention of a meningitis that the physician is called in, and his first impression of the complaint, as we have already stated, is apt to favour the idea of an idiopathic inflammation of the brain, the patient and friends directing his attention to the cerebral signs without alluding to the affection of the ear, they themselves not being aware of their connection.

The **Diagnosis** in such cases is very important, inasmuch as the bloodletting required to save the patient in the one instance would destroy him in the other.

In the sympathetic inflammation of the membrane of the brain, in cases of otorrhœa, there are prominent local signs as regards the head; there is a deep-seated, severe throbbing pain in the middle of one side of the head, with great tenderness of the scalp on the same side, which prevents the patient lying upon it; there is no marked suffusion of the face and conjunctiva; the expression of the eye is rather dull; the delirium is little active, and is complicated with heaviness of the head, and some stupor; the fever is not severe in proportion to the local signs, nor is the force of the circulation great, the pulse being rather tight than full, and rather sharp than strong; the fever is moderate in the day, with a marked exacerbation at night.

In the idiopathic inflammation of the membranes of the brain, on the other hand, instead of local pain, there is a sense of constriction over the whole head, without tenderness of the scalp; the suffusion of the face and conjunctiva is very marked; the eye vivid, the delirium violent, without heaviness of the head or stupor; the fever runs high, and though it may have exacerbations, it is continually urgent, and the force of the circulation is decided, the pulse being full and strong.

These distinctions cannot fail to strike the physician, if he is cautious and circumspect in forming an opinion.

The **Cause** of the otorrhœa is invariably an inflammation of the tympanum, which may be excited by a current of air playing upon the side of the head, or may arise, as it more frequently does, from the spreading of inflammation by the sympathy of continuity from the throat along the Eustachian tube. Hence the origin of the disease is often referred to the period when the patient had the small-pox or scarlet fever. The deafness, which is a common consequence of the scarlet fever, is produced in this manner.

Treatment.—In speaking of the treatment of the affections of the ear, described in this article, viz., of the otalgia, the otitis interna, the otorrhœa, and of the occasional attacks of inflammation which supervene on the otorrhœa, all which affections are stages of the same disease, we cannot do better than retain the order already adopted, it being the one in which these stages naturally succeed each other.

It is scarcely necessary in this place to advert to the means of relieving the otalgia, or ear-ach, which has been shown to depend on inflammation of the tympanum, more or less acute; we shall therefore pass on at once to the treatment of the otitis interna, reserving what few remarks we have to offer on the cure of otalgia for the conclusion of this article.

Treatment of the Acute Internal Otitis.—This intense inflammation of the tympanum can be controlled only by very decided antiphlogistic measures, adopted without hesitation or delay, the object being to arrest the inflammation, and, by procuring its resolution, to prevent all those disastrous consequences which accrue from its termination in suppuration.

In detailing the symptoms of this otitis, we stated that the local signs of pain and so on were intense, while the general febrile movement, though fully developed, was not urgent in an equal degree; and as we hold it to be a principle in the treatment of all diseases, that the more the local signs exceed the general, the greater will be the relief from local depletion, we shall be guided by this principle in our recommendation of the treatment to be pursued. In place, therefore, of relying chiefly on the abstraction of blood from a vein, we urge the free and repeated application of leeches to the ear affected; premising, however, that one bloodletting should be practised to an extent consistent with the age, sex, constitution, and spare or plethoric habit of the patient. Let blood, then, be first drawn from the arm, or from the external jugular vein, which is preferable, to the amount of ten, fifteen, or twenty ounces, according to the circumstances above-mentioned, and, guided by the same circumstances, let it be followed up by leeches applied over the mastoid process of the ear affected, to the number of from six to eighteen. Repeat the application of leeches once in six hours at least; and that time may not be lost, let a blister be placed on the nape of the neck, which will leave the region of the ear free for the use of more leeches, if required. Fomentations can seldom be borne early in this inflammation; they accumulate heat, and aggravate the sufferings of the patient; nor is any medicament to be introduced into the external meatus for the same reason. In addition to the abstraction of blood, and to the counter-irritation, an active aperient, consisting of calomel and jalap, in the proportion of four grains and ten, or of a dose of calomel, quickly followed by a purging draught of ten drachms of infusion of senna and two drachms of tartrate of potash, should be administered; and in the course of four hours give one or two grains of calomel, with a quarter of a grain of tartarized antimony, every two hours through the first day, and every three or four hours through the second, when it will generally be necessary to omit the antimony, on account of the exhausted powers of the patient; the calomel to be continued in such quantity and as frequently as the then existing symptoms demand, remembering that, next to the abstraction of blood, our main reliance is to be placed on the mercury to procure the resolution of the inflammation. Opium is not admissible in any form or quantity; it distracts the patient.

If by this treatment the urgent signs should gradually abate and the inflammation pass away, the patient's appetite will quickly return, and a speedy convalescence be established. If, however, the symptoms do not yield to the vigorous treatment adopted, it is to be feared that suppuration

of the tympanum will ensue, which will be further indicated by the increase of the sense of bursting of the part, by the throbbing character of pain, the delirium, and general headach. Fomentations and poultices may now be had recourse to; the anti-inflammatory measures should be relinquished; and as soon as the ulcerative perforation of the membrana tympani has been effected, and the matter begins to discharge itself by the external meatus, the powers of the patient should be supported by ammonia, and sleep procured by opium.

If, with the discharge from the meatus, the throbbing pain, sense of distension, &c. do not manifestly and speedily subside, it is to be concluded that the perforation of the membrana tympani is too small to admit of the free exit of the matter, and an operation to enlarge the perforation is at once to be contemplated; and being effected, the sufferings arising from the matter hitherto confined in the cavity of the tympanum will be alleviated, a copious discharge ensured, and an otorrhœa established.

[In cases of *blennorrhœal otitis* of the middle ear, it has been advised that the air *douche* should be employed; and if a slight mucous *râle* be heard, on applying the ear to that of the patient, whilst the air is streaming in, followed by a material improvement in the hearing, which may be ascertained by the distance at which he hears the ticking of a watch, it has been advised, that it should be employed daily. Should no improvement, however, in the sense of hearing take place after the fourth sitting, it has been considered that the attempt should not be persisted in.

The careful introduction of the catheter into the Eustachian tube may be necessary in this variety.]

Treatment of the Otorrhœa.—In the foregoing part of this article, we have remarked the untractable nature of the chronic puriform discharge from the ear, and that its dangerous tendency depends on the decomposition and retention of the matter in the cavity of the tympanum, that cavity, owing to its peculiar construction, holding the matter as in a well. The indication, therefore, in the treatment is to prevent this lodgment of the irritating matter, and the manifest and only means of accomplishing this end is by cleansing the cavity of the tympanum by the aid of injections. As to the composition of the injections, it matters little; warm water or milk-and-water will answer the purpose as well as any thing more medicated. Care must be taken in the first use of the injection, which should be administered without much force until the parts are become habituated to it, otherwise a shock from the syringe might be very distressing to the patient. Should the discharge persist and become chronic, then astringent injections would be very proper. Itard recommends the caustic potass dissolved in rose-water. The sulphate of zinc offers a good remedy, so does the nitrate of silver; the proportions to be weak in the first instance, and increased in strength as circumstances indicate.

Although the injections may not be effectual in restraining or curing the otorrhœa, they have the power to counteract its destructive and dangerous tendency to disorganization, an apposite illustration of which we are able to furnish in the case of an old lady, now near seventy years of age, who has been affected with otorrhœa from both ears, and deafness, since she had the scarlet fever in childhood, and who, by the daily injection of warm water, has preserved the organs from further disorganization, and has escaped the disastrous effects and premature death which a progressive caries inevitably leads to.

[It is proper to remark, that it is extremely common to find persons pass through a long life, who have been subject, from infancy perhaps, to discharges from the middle ear, and who make use of no injections whatever. It is important, indeed, to be cautious in the use of astringent injections especially, where the otorrhœa has persisted long, inasmuch as a sudden suppression of the accustomed secretion — although morbid — may give occasion to the transference of the irritation elsewhere, and, it may happen, to parts of greater importance. In all cases, it is essential to attend to the constitutional condition, and if there be evidences of a strumous complication, as there often is, the tone of the system must be improved by remedies that are adapted for scrofulosis, and especially by the use of iodine — as the iodide of iron—singly or combined with appropriate diet, change of air, &c.

Where it is not considered advisable to interfere actively with the discharge, the disagreeable fœtor, as elsewhere remarked, may be very much diminished by appropriate injections of a disinfectant nature—as of weak solutions of chlorinated lime or chlorinated soda. (*Practice of Medicine*, 2d edit., ii. 361, Philad. 1844.)]

Treatment of the attacks of inflammation which occasionally supervene on the chronic otorrhœa.—The violence and danger of these attacks will be proportionate to the extent of the caries of the ear and the disorganization of the membranes of the brain at the period of their occurrence. While they affect the ear only, they need not excite alarm, because they subside in a few days by the application of leeches to the mastoid process, and by mild antiphlogistic measures. But when the disorganization has extended to the dura mater and brain, the inflammation affects these parts in common with the ear, and the symptoms assume a very formidable aspect. Yet it must be remembered that the cause of these attacks is the check given to the discharge either by cold or accidental obstruction, and that, therefore, the symptoms of the cerebral affection are more or less sympathetic, and partake of those of irritation. There is a train of actions set up in the brain depending on a local cause, which cause being done away, the undue actions subside. For this reason every means must be sedulously adopted to encourage a return of the discharge, as fomentations and poultices to the side of the head, and bloodletting must be employed only so far as to restrain the inflammation within limits consistent with life; for if blood is drawn ever so freely, it cannot put an end to the attack, as in an idiopathic meningitis, and it will sink the patient as soon as the discharge returns. In these cases mercury is not required; it is worse than useless if carried to any extent. In every attack of this nature the practitioner should not neglect to examine the affected side of the head attentively, as such an attack is apt to super-

vene at the period of the formation of an abscess behind the ear from the carious perforation of the mastoid process. Should an abscess be discovered in this situation, a very free perpendicular incision is to be made, not only down to the process, but through the carious walls of the process itself into the cells, and relief will be immediately afforded to the cerebral symptoms. The writer was once called to a case of this description, which had been viewed and treated as an idiopathic phrenitis, when he discovered a large abscess presenting behind the ear; it was opened, and discharged a quantity of most offensive pus. The patient was relieved, but she sunk from the copious bloodlettings practised under the erroneous diagnosis of cerebral inflammation.

In one case in which a free opening was made into the mastoid cells by incision, as we have advised, a spontaneous cure of the otorrhœa followed.

The administration of injections in the chronic otorrhœa must not be adopted without some precaution; not without first estimating the extent of the carious disorganization; for should this have penetrated the skull, and a fluid be forced into contact with the dura mater, or this being ulcerated, into contact with the brain, a fatal inflammation would be the result. The extent of the disorganization may be determined correctly by the character of the symptoms. While the disease has not extended beyond the ear, the sufferings are referred to this organ by the patient, the pain being deep seated in the ear, and radiating from it over the side of the head; but as soon as the dura mater and brain are involved, the signs of cerebral affection predominate, the complaints now being all referred to the brain. This diagnosis will be a safe guide, and should be borne in mind. The disease being limited to the ear, will be benefited by the use of injections, and further mischief may by them be probably guarded against; but when it has reached the brain, injections are not justifiable.

The treatment of the otalgia does not call for any particular measures further than such as are appropriate to the relief of the inflammation, be it subacute or acute, of which the otalgia is a sign. The remarks it is of consequence here to make are, that the otalgia, or ear-ach, is indicative of an inflammatory congestion of the tympanum, which should not be neglected however trivial it may appear. Though the patient may not estimate the importance of an ear-ach, the practitioner should do so, and not be content until he has removed it by the application of leeches to the mastoid process, by aperients and so forth; not trusting to popular remedies placed in the meatus, but rejecting them; and taking a proper pathological view of the nature of the affection, of the dependence of otalgia on inflammation of the tympanum, he should combat it by appropriate remedies accordingly, and so preserve the patient from impairment of the sense of hearing, or from that disorganization of the ear of which even a very subacute otitis may be the unsuspected forerunner.

JOHN BURNE.

OVARIA, DISEASES OF THE.

I. OF THE STRUCTURE AND FUNCTIONS OF THE OVARIA.—In the human subject, after the age of puberty, the ovaria form two oblong flattened bodies, about an inch and a half in length, which are situated on the sides of the uterus in the posterior duplicatures of the broad ligaments. They are placed a little below the fallopian tubes, near the superior angles of the uterus, to which they are fixed by a short ligament. Their surface, except at the inferior margin where the blood-vessels enter, is smooth and convex. In the fœtus at the full period, the ovaria form long, slender bodies of a prismatic form, and are placed above the brim of the pelvis. In advanced life, they become hard and shrivelled, with deep irregular fissures in their surface.

Each ovarium consists of a peritoneal coat, and a dense fibrous or parenchymatous structure. In this latter texture are imbedded from twelve to twenty vesicular bodies of various sizes, which are named, from their supposed discoverer, the Graafian Vesicles, or Ovula Graafiana. They are composed of a fine membrane, which is separable into two layers, and contain within their cavity a clear coagulable fluid.

Branches of the spermatic arteries and veins are distributed to the ovaria, and they are also abundantly supplied by nerves and absorbents.

The remarkable changes produced in the intellectual and physical constitution of women, at the age of puberty, by the development of the ovaria, have been accurately described by Harvey in the following passage: "nec minus notum est, quanta virgini alteratio contingat, increscente primum et tepefacto utero; pubescet nempe, coloratior evadit, mammæ protuberant, pulchrior vultus renidet, splendent oculi, vox canora, incessus, gestus, sermo, omnia decora fiunt."

There are certain facts which seem to prove that it is not to the influence of the uterus, but of the ovaria that we are to attribute all the changes which take place in the female pelvis, in the mammæ and uterine system, at the period of puberty; and it seems not improbable from the following facts, that it is also to certain changes in the Graafian vesicles at the time of menstruation, that all the phenomena of that singular process are to be referred.

The case of a young woman who died at the age of twenty-nine, in whom the ovaria were wanting, was published by Mr. Charles Pears, in the second part of the Transactions of the Royal Society of London for 1805, and the following appearances have been recorded. "Having ceased to grow at ten years of age, she was in stature not more than four feet six inches high. The breadth across the shoulders was as much as fourteen inches, but her pelvis measured only nine inches from the ossa ilia to the sacrum. Her breasts and nipples never enlarged more than in the male subject. She never menstruated; there was no appearance of hair on the pubis, nor were there any indications of puberty in mind or body at twenty-nine years of age."

In the young woman, whose ovaria were extirpated by Mr. Pott in an operation for inguinal hernia, menstruation ceased, the voice became hoarse, the mammæ shrunk, and hair appeared on

the chin and upper lip. Before this period this female was stout, large breasted, and menstruated regularly. (Pott's Works, vol. ii. p. 210.)

Mr. Yarrel has shown that where there is a shrinking and shrivelling of the ovaria from disease in young birds, the hen bird assumes in many instances the plumage of the male. "Thus, in several mules (hen birds with male plumage) the ovarium has been found variously diseased; sometimes the oviducts appear to have been inflamed, and adhesions to have taken place between their opposite sides, so that they become obliterated; at other times the ovaria are shrivelled and of a black colour, and appear as if they had never been in progress to maturity. This black colour also pervades the oviduct, which is smaller than natural, and often impervious in some parts. In old birds it might fairly have been alleged that the destruction of the ovarium and the change of plumage followed only the general obliteration induced by age, and that the one was not dependent on the other; but the fact that destruction by disease of the ovarium in the young bird induces a similar change, and the destruction of the oviduct by art being followed by an alteration incomplete indeed, but in many respects resembling the one mentioned, sets the question at rest." (Dr. Seymour's Illustrations of Diseases of the Ovaria, 8vo. 1830, p. 36.)

Dr. Elliotson related to the writer of this article the history of the following interesting case, which came under his notice upwards of ten years ago. "A young woman," he says, "consulted me for amenorrhœa; she had never menstruated, and yet had violent pains every month. I strongly suspected there was some organic disease, and wished to obtain permission to examine, but to this she would not consent, and did not return to me for a considerable period. She informed me when she again consulted me, that she had been married for a year, but had never menstruated. I then thought I must have been wrong, and that there was no organic cause. I asked if she was happy with her husband, and from her answer concluded that sexual intercourse went on. The husband afterwards came to me and stated that he had not encountered any impediment to connection, but that he gave her violent pain at the time. I afterwards was permitted to examine, and then found there was no vagina; the part on opening the labia being as flat as the palm of my hand. She had most excruciating pains in the pelvis every month; there was every symptom of menstruation except the discharge. At my desire she was examined by Mr. Henry Cline, who plunged a lancet between the labia, but found nothing. She went on with these monthly pains, which she had experienced ever since puberty, and her life was rendered utterly wretched. I begged Mr. Cline to make another attempt, and he put in a bistoury as far as he dared go, but found nothing. Every sort of examination was afterwards made, and no uterus could be discovered. She remained several years in this situation, when her husband died and she has married again. Though there was no uterus, it was evident from the appearance of the mammæ and other circumstances, that the ovaria had been fully developed."

Through the kindness of Mr. Girdwood, of Paddington, we had an opportunity in 1831 of seeing a case in many respects similar to the preceding, in which there appeared to be a deficiency of the uterus, and an effort at menstruation every monthly period. The patient was twenty-five years of age, and had been married two years, though she had never menstruated. Every month there was great pain in the region of the pelvis, which lasted for several days and then went off, without any menstrual discharge taking place. The mammæ and external sexual organs were fully developed. On examination at the posterior part of the vagina, the finger readily passed into a short cul-de-sac about an inch and a half in length. From ocular inspection, it was evident that this cul-de-sac did not reach the meatus urinarius, but between them was a narrow opening which admitted the catheter, and which could be passed up four or five inches. This canal was gradually dilated so as to admit the finger the whole length, but not the slightest trace of a body like the uterus existed at its upper extremity.

Mr. Cæsar Hawkins has related to us the case of a woman who had the vagina and uterus completely obstructed after parturition, and in whom there was a monthly effort at menstruation, though no menstrual fluid was secreted. No swelling of the abdomen took place; and though incisions were made through the vagina into the uterus, no fluid escaped.

In Beck's Medical Jurisprudence, somewhat similar cases are referred to.

On the 11th of March, 1831, we examined the body of a young woman who died during menstruation from inflammation of the median basilic vein. The left ovarium was larger than the right, and at one point a small circular opening with thin irregular edges was observed in the peritoneal coat, which led to a cavity of no great depth in the ovarium. Around the opening, to an extent of three or four lines, the surface of the ovarium was of a bright red colour, and considerably elevated above the surrounding part of the peritoneal coat. On cutting into the ovarium, its substance around the opening and depression was vascular, and several Graafian vesicles of different sizes were observed. The right ovarium was in the ordinary state. Both fallopian tubes were intensely red and swollen, and their cavities were filled with menstrual fluid. The lining membrane of the uterus was coated with the same fluid, and the parietes were soft and vascular. The size of the uterus was not increased.

In the autumn of the same year a woman, under twenty years of age, died suddenly from acute inflammation of the lungs while menstruating. The body was examined by Mr. John Prout, and the uterine organs were brought to us for inspection. A red, soft, elevated portion of the right ovarium was also here observed, and at one part the peritoneal coat to a small extent had been removed. The edges of the opening were extremely thin and irregular, and in the substance of the ovarium under the opening was an enlarged Graafian vesicle, filled with transparent fluid. Numerous small blood-vessels were seen running along the peritoneal coat of the ovary to the opening. When the substance of the ovarium was laid open, several vesicles of various sizes, and a

different depths, were found imbedded in it. The left ovarium presented a natural appearance. The free extremities of the fallopian tubes were gorged with blood. Their cavities were filled with a red coloured fluid. The uterus was not enlarged, but the parietes were gorged with blood, and the lining membrane of the fundus was coated with menstrual fluid. A small coagulum of blood likewise adhered to the upper part of the uterus.

On the 2d of July, 1832, Sir Astley Cooper, to whom the writer had mentioned these cases, sent him the ovarium of a woman who died from cholera while menstruating. The ovarium was much larger than natural, and at one point there was a small irregular aperture in its peritoneal coat, through which a portion of a slender coagulum of blood was suspended. On cutting into the substance of the ovarium, it was found to be occupied by three small cavities or cysts, one of which was filled with a clear ropy fluid, another with semi-fluid blood, and the third, which communicated with the opening in the peritoneal coat of the ovarium, with a firm coagulum.

On the 18th of November, 1832, the uterine organs were removed by Messrs. Girdwood and Webster, from the body of a young woman who had died suddenly the preceding day when the catamenia were flowing. Both ovaria were remarkably large, and both fallopian tubes were red and turgid. The peritoneal coat of the left ovarium was perforated at that extremity which was nearest to the uterus by a circular opening, around which aperture for several lines the surface of the ovarium was elevated and of a bright scarlet colour, like extravasated injection. The margin of this opening was thin and smooth, and did not appear to have been produced by laceration. Its centre was slightly depressed below the level of the edges, but there was scarcely the appearance of a cavity beneath. The right ovarium was much larger than the left; and when cut into, a cavity or cyst was found which was filled with half coagulated blood. The peritoneal coat of this ovarium was entire.

The uterus was large, and when cut into, the parietes appeared to contain an unusual quantity of blood. The inner membrane was of a bright red colour, and coated with a thin layer of catamenial fluid. Both fallopian tubes were red and turgid, and the interior of the left was filled with menstrual fluid, but nothing in the form of a Graafian vesicle could be detected in the tube. The appearances now described have been accurately represented in a drawing made from the parts within two hours after they came into the author's possession.

In a paper by Mr. Cruikshanks, published in 1797, there is an account of similar appearances having been observed by him in a young woman who had died at the monthly period. "I have also," he says, "in my possession the uterus and ovaria of a young woman who died with the menses upon her. The external membranes of the ovary were burst at one place, from whence I suspect an ovum escaped, descended through the tube to the uterus, and was washed off by the menstrual blood."

Dr. Power has likewise conjectured that an ovum escaping from the ovarium at every monthly period is the cause of menstruation, which he has defined to be "an imperfect or disappointed action of the uterus in the formation of the membrane (decidua,) which is requisite for its connection with the impregnated ovum." (An Essay on the Periodical Discharge of the Human Female, by J. Power, M. D. 1832.) This hypothesis does not appear to have been formed from actual observations on the ovaria during menstruation, as Dr. Power has made no allusion to these in his work, and does not state that he has ever examined the body of any individual who died with the menses upon her. That an ovum, by which is usually meant an embryo enveloped in membranes, does not pass from the ovarium during menstruation, is evident from the fact that an ovum is never formed but as a consequence of impregnation, and that conception does not take place at the menstrual period. The facts which have now been related render it, however, extremely probable that all the phenomena of menstruation depend upon or are connected with some peculiar changes in the Graafian vesicles, in consequence of which an opening is formed in their peritoneal and proper coats. Whether an entire vesicle, or only the fluid it contains, escapes through this opening at the period of menstruation, further observations may hereafter determine. There is no proof whatever that an ovum passes along the fallopian tube into the uterus during menstruation, and it is not clearly established that this takes place even subsequent to conception.

[The opinion that menstruation is connected with periodical changes in the ovary is now embraced by most obstetrical physiologists, and especially by Négrier, Gendrin, and Raciborski. (See the author's *Human Physiology*, 5th edit. ii. 348: Philad. 1844.)]

Menstruation probably does not take place during infancy, because the ovaria are not then developed, and it is absent during pregnancy and lactation, because at these periods they are in a quiescent state. After the age of forty-six the catamenia cease, because the parenchymatous structure of the ovaria has partially disappeared, and the Graafian vesicles have degenerated into thick opaque cysts.

In many cases of disordered menstruation, chlorosis, and hysteria, which we have observed, the symptoms have been clearly referable to certain morbid states of the uterine appendages, and decided benefit has resulted from the application of those local remedies which were employed with the view of subduing the irritation, congestion, or inflammation, which appeared to be present in these parts of the uterine system.

II. Diseases of the Ovaria.

1. Inflammation and its consequences.—In the unimpregnated state, the ovaria are not very subject to those severe attacks of inflammation which produce an alteration in their structure. In most cases of puerperal fever, the peritoneal and parenchymatous textures of the ovaria become inflamed, and not unfrequently their structure becomes completely disorganized. In the article Puerperal Fever in this work, a full account has been given of these morbid changes,

and of the varied symptoms to which they give rise during life. The adhesions between the ovaria and fallopian tubes which are so frequently met with in examining the bodies of women of different ages and conditions of life, prove that slight attacks of inflammation of the peritoneal coat of the ovaria are not of rare occurrence, and that their presence is seldom discovered during life. Abscess of the ovarium from chronic inflammation of the parenchymatous structure, though a rare disease, does sometimes occur, as the following cases will show :

A woman, æt. 17, of the lowest and most unfortunate class of females, was a patient of Guy's Hospital, under the care of Dr. Bright, in the autumn of 1823. She was greatly emaciated, had a very quick and feeble pulse, a shining red tongue, and constant watchfulness. She suffered from constant and irresistible diarrhœa, and for many successive days vomited both food and medicine : the catamenia were absent. After having been in the hospital about two months, she suddenly complained of most acute pain over the abdomen, and in a few hours expired. On opening the abdomen, death appeared to have been produced by the effusion of a large quantity of pus into the peritoneal cavity, which escaped from an abscess in the right ovarium, which abscess appeared to arise from suppuration in the substance of the viscus, similar in every respect to phlegmonous abscess in any part of the body, and not connected with any cyst, or change or addition of structure, the product of morbid growth. (Dr. Seymour's Illustrations, p. 41.) A woman, whose case has been recorded by Dr. Taylor, of Philadelphia, had an abdominal tumour, which was considered to be an encysted dropsy of the ovary. On inspecting the body after death, the tumour, which occupied the whole abdominal cavity, and weighed seventeen pounds, was found to be formed by one of the ovaries, but in no respect did it resemble ovarian dropsy, being a large cyst, containing twenty pints of pus. (North American Med. and Surg. Journ., 1826.)

[When acute inflammation of the ovary is accompanied by metritis or peritonitis, it may be difficult, if not impracticable, to detect the ovarian phlegmasia. When the ovary is affected alone, burning pain will be experienced deep in the side of the pelvis in which it is situate, accompanied by the ordinary general symptoms that belong to acute inflammation of the internal viscera. Usually, however, the constitutional affection is not severe. Not much information can be obtained by examination *per vaginam*. A recent writer, however,(Leroy d'Etiolles,)speaks of having detected the ovarian tumour — owing to its sinking down—by the finger in the vagina. The finger, passed into the rectum, according to M. Löwenhardt, can reach the situation of the ovary, and may discover any tumefaction of the organ, or unusual tenderness on pressure. Pain is likewise experienced by the pressure of the distended rectum during defecation.

In the chronic form of ovaritis, the local phenomena are of the same character as in the acute, but less in degree, and it must be diagnosticated by the same mode of exploration. The disease is, however, necessarily more obscure.

Inflammation of the ovary, both acute and chronic, may terminate by resolution, by tumefaction and induration or softening, by suppuration, the formation of serous cysts, fibrous tumours, &c., and when both ovaries are affected, the menstrual function is interfered with, — generally, indeed, suspended. Sterility is a common consequence of the ovarian changes.

Ovaritis would seem to have been most frequently induced by sudden suppression of the catamenia, or by irregular exposure during the menstrual period. Most frequently, however, it follows labour, and has often been observed amongst the morbid appearances in puerperal fever. It has been affirmed, that females affected with gonorrhœa are liable to it, in the same manner as males, affected with the same disease, are liable to orchitis. Dr. Simpson, however, (Tweedie's *Library of Medicine*, 2d Amer. edit., iii. 342, Philad. 1842,) states, that he has watched diligently for its occurrence in some hundreds of cases of gonorrhœa, which have been under his care in the Lock Hospital of Edinburgh, but that he has only met with one, and that a doubtful instance. In two cases, recorded by M. Leroy d'Etiolles, the disease supervened on the use of uterine injections. The injections were sent with moderate force into the uterus by the aid of a gum-elastic tube. In one, the quantity of marsh mallows was ten drachms ; and in both cases, the liquid had scarcely reached the cavity of the uterus, before the patients complained of acute pain in the side.

The treatment differs in no respect from that which is adapted for inflammation of the uterus.]

2. **Cysts and Tumours of the Ovaria.** — There are perhaps no organs in the human body in which cysts containing a fluid are so frequently found developed as in the appendages of the uterus, and particularly in the ovaria. These sacs or cysts, which have not unfrequently been confounded with hydatids, constitute the disease termed encysted or ovarian dropsy ; and it scarcely admits of a doubt, from the progressive enlargement observed in the Graafian vesicles, that these cysts often originate in a morbid distension of these bodies. In other cases, ovarian dropsy arises from the development of a solitary serous cyst in the neighbourhood of the uterus, in the folds of the broad ligaments, or connected with the ovaria, if not imbedded in their substance. The whole substance of the ovarium is converted into a large bag containing a fluid, or into a congeries of cysts of different sizes, which have no communication with each other. These cysts, which differ considerably in the density of their coats, contain fluids which vary in colour and consistence. In some it is serous, mixed with a slimy, ropy fluid, like jelly ; in others it is a purulent fluid, or dark-coloured like coffee-grounds, and in two instances observed by us, the matter contained in these cysts resembled custard or soft cheese. A small ovarian cyst contained a thick dark-brown fluid like treacle, which did not become decomposed by pressure.

Dr. Hodgkin has recently investigated the structure and mode of formation of some of the more complicated varieties of ovarian cysts and tumours. He has given the following description of the

compound serous cyst, which is often complicated with malignant disease of the ovaria:

"In this form we observe on the interior surface of the principal cyst, elevations, more or less rounded and of various sizes, projecting into the interior of the cavity, and covered by a membrane which is continuous with the lining of the principal sac.

"On making an incision into these tumours, we find they also consist of cysts of a secondary order, filled by a secretion, often serous, but almost as frequently mucous. It is not, however, merely by this secretion that these cysts are filled. On looking more minutely into them, we shall generally find that from one or more points on the interior of these cysts there grows a cluster of other or lectiary cysts, upon which is reflected the lining membrane of the cyst in which they are contained. Cysts of the secondary order not unfrequently afford as complete specimens of a reflected serous membrane as either the pericardium or tunica vaginalis, the lining membrane of the containing cyst corresponding to the reflected portion, as that covering the contained bunch of cysts does to the close portion.

"The proportion which the contained cysts bear to the cavity of the membrane reflected over them is extremely various. Sometimes the fluid, especially when it is of a serous character, nearly fills the containing cyst, whilst the bunch of cysts is of very considerable size. At other times the superior cyst is almost entirely filled by those of the inferior order, in which case we may generally find that the nodulose or tuberose elevations, which we may have observed on the exterior of the containing cyst, are occasioned by the unequal development of the contained cysts; for those which have grown most rapidly and have attained the largest size, forcibly dilating that part of the cyst which is reflected over them, produce a kind of hernia at that part. It sometimes happens that the distension occasioned by the growth of the contained cysts is sufficient not only to disturb the even surface of the containing cyst, but actually to produce a rupture, which admits both of the escape of its fluid contents and of the unrepressed growth of the secondary or lectiary cysts, which took their origin from its internal surface." (Med. Chir. Trans. vol. xv. p. 282.)

Dr. Hodgkin endeavours to explain the formation of the different heterologe deposits or accidental structures on the same principles. Ovarian cysts are not unfrequently combined with a great enlargement of the organ, by which it becomes converted into a whitish, hard, cartilaginous mass, like the fibrous tumour of the uterus. These diseases are indeed not unfrequently present in the same individual, and they commence and run their course in the same manner. Portions of these fibrous tumours of the ovaria are sometimes converted into calcareous concretions like those of the uterus, or a process of softening commences in different parts, in consequence of which the fibrous structure is completely destroyed, and large irregular cavities are formed, containing a dark-coloured gelatinous fluid. Dr. Seymour in his valuable work has described ovarian tumours of the above description under the term scirrhus of the ovaria, though they are not of a malignant nature, and have no tendency to degenerate into cancer. "In the museum of the College of Physicians there is a preparation," Dr. Seymour observes, p. 59, "which has received the sanction of Dr. Baillie as a specimen of this rare disease. It is a section of a scirrhous ovarium, (resembling more a section of scirrhous testicle than the ordinary appearance of the ovarium under this disease,) which was in various parts beginning to soften, the substance breaking down into thick brown fetid fluid. This preparation was taken from a patient who died of cancer of the stomach, and Dr. Baillie says in his Catalogue is the same disease. It does not appear whether any distinguishing symptoms either of the locality of the disease or its peculiar nature existed during life."

The following example of this disease of the ovarium, which Dr. Seymour considers to be extremely rare, and the history of which he has recorded in his work, came under our notice several years ago.

At Blandford Mews on the 9th of August, 1828, we opened the body of a woman upwards of seventy years of age, who had died after long suffering from a tumour in the hypogastrium with ascites. An induration had been first perceived in the abdomen, between the navel and right ilium, nine years before, after she had suffered considerably for some months from sense of weight and dull pain in this situation. The size of the tumour gradually increased, and some years before death, (the belly being greatly distended with fluid,) the operation of paracentesis abdominis was performed by Mr. Blagden, and several pints of water were drawn off. In the course of the succeeding years the operation was frequently repeated; but the quantity of fluid evacuated gradually diminished, whilst the large indurated moveable mass came to occupy the whole of the lower part of the abdomen. She sank gradually from the interruption to the circulation caused by the tumour. On opening the abdomen, there was found attached to the fundus uteri, on the right side, an ovarian tumour weighing seven pounds, of a dense and fibrous structure. Several large cysts, containing a fluid varying in colour and consistence, adhered to the upper surface of the tumour. The peritoneum, in contact with its anterior surface, was converted into a cartilaginous substance, about a quarter of an inch in thickness. In the proper tissue of the uterus, at its fundus, was observed a fibro-cartilaginous tumour about the size of a large orange. In other respects the uterus was healthy.

The affections of the ovaria which have now been described do not partake of the nature of cancer, and have no disposition to degenerate into a malignant form. The injurious effects upon the system which they produce result entirely from the pressure and irritation which they excite in the abdominal and pelvic viscera, and some of the remote organs of the body. The cysts may descend between the bladder and rectum, and becoming firmly fixed by adhesions in this situation, interrupt the evacuation of the urine and fæces. In a case which lately came under our observation in the Saint Marylebone Infirmary, an ovarian cyst having become firmly impacted between the bladder and rectum, produced all the symptoms

of stricture of the rectum. In a lady now under our care, the presence of an ovarian or uterine tumour in the pelvis, which presses upon the neck of the bladder, renders it impossible for the bladder to be emptied without the introduction of the catheter. The effects of these tumours in impeding the progress of the child through the pelvis during labour have been fully described by Dr. Park and Dr. Merriman in the third and tenth volumes of the Medico-Chirurgical Transactions.

When the ovarian cysts remain at the brim of the pelvis, in the progress of their enlargement they gradually produce all the usual consequences of interrupted circulation in the pelvic viscera and lower extremities. Attacks of inflammation occasionally take place in their capsules, by which they contract adhesions with the surrounding organs, and pus is poured out into their cavities. After a time effusions of dropsical fluid take place into the peritoneal sac, and sooner or later the patient dies exhausted from the long-continued pressure and irritation of the abdominal and other viscera.

Encysted dropsy of the ovarium can generally be distinguished from ascites by the following symptoms. The tumour commences on one side of the abdomen, its surface is unequal, and its fluctuation, if felt at all, is very obscure. The health is at first but little impaired, and the thirst, scanty urine, and other symptoms which characterize general dropsy, are wanting. The catamenia are usually extremely irregular or altogether wanting. When both ovaria are diseased, Dr. Seymour states that the menses are always absent. Great difference is observed with respect to the progress of the disease in different individuals; in some it would appear to become stationary, or altogether cease to extend; while in others it goes on much more quickly to a fatal termination. In some cases, if we are to credit the histories which have been given by authors, recovery has taken place from a fright, blows, or from sudden exertion. Dr. Mead relates a case where eighteen pints of water escaped by a rupture of the sac through the umbilicus; Dr. Blundell relates that a lady afflicted with ovarian dropsy, falling from a carriage, struck her belly against a stone, and that a considerable discharge of urine occurred: she recovered, married, and dying subsequently of retroversion of the uterus, the cyst of her former complaint was found to have burst, and its contents effused into the abdominal cavity to have been absorbed.

Cysts containing a fatty matter intermixed with hair and teeth have frequently been met with either in the substance of one of the ovaria, or adhering to them by a narrow neck. They have been found before the age of puberty, and consequently do not arise from impregnation. In Ruysch's Museum was a tumour of teeth and hair which he found in a man's stomach. A little under the right kidney of a dead gelding, Mr. Colman met with a cyst containing fatty matter, hair, and teeth: and Mr. Brodie found a jaw, with full-grown teeth, in the bladder. Dr. Gordon met with a tumour in the thorax of a woman, which was considered during life to be aneurismal, but on examination after death appeared to be composed chiefly of the debris of a fœtus, which was situated in the anterior mediastinum, and adhered strongly to the sternum. It contained a sebaceous matter mixed with hairs, and a portion of a bone which appeared to be the superior maxillary bone. We are inclined to consider all these singular productions as wholly unconnected with conception in the bodies of the individuals in whom they have been found, and to view them as examples of that species of monstrosity which has been so fully described by Ollivier and Breschet, under the term *Diplogénèses par pénétration*.

Dr. Baillie states that the hairs are most of them loose in the fatty substance, but many of them also adhere to the inside of the capsule. Andral describes these hairs as sometimes intimately mixed up with the fatty matter, at other times as isolated from one another, or re-united into inextricable tufts. Their two extremities are usually alike, and in all the cases which he has examined there has been no bulb. (Précis d'Anatomie Pathologique, tom. iii. p. 710.)

Meckel, however, observed their bulbs in one of the cases which he examined, where the hairs were short and isolated, and were almost implanted into the walls of the sac which formed the envelopment of the tumour. He relates also from Tuniati, a case where the hairs had a white oval extremity covered by a fine skin, which was confined to the bulb, and was separated from it by an oleaginous fluid. (Memoire sur les poils et les dents, &c. par F. Meckel dans le Journal Complementaire cahier, 15 & 65.)

These hairs differ greatly in length and colour, some are only a few lines in length, some several inches; others have been seen which measured two feet three inches. Andral states that these hairs have not always a colour analogous to that of the hair of the individual in whom they are found. A negress had a cyst with cartilaginous walls in the mesentery. This contained a sebaceous matter, in the midst of which were numerous hairs, of a colour entirely different from the woolly black locks of the African woman. They were smooth, soft to the touch, white or red, and some of a silvery hue, like those of an infant of the European race.

In almost all the cases where teeth have been found, they have been implanted into the fragments of bony or cartilaginous matter, and have resembled the rudiments of maxillary bones and alveolæ. Meckel thinks that these accidental teeth are produced like ordinary teeth in capsules filled with a gelatinous fluid.

The presence of these tumours in the ovaria has sometimes given rise to serious obstacles to the delivery of the child in parturition, and to fatal inflammation after labour. The following example of this termination of the disease has been recorded by Dr. Seymour at page 8: "A woman about thirty years of age, some weeks after delivery, having been admitted into St. George's Hospital under the late Dr. Young with symptoms of enteritis, which speedily proved fatal, the inferior portion of the small intestines was found inflamed, which inflammation appeared to have been excited by the presence of a tumour of the size of a large cricket-ball, which had become attached by a narrow neck to the left ovarium. Its proper coat was of a fibrous texture and of a purple co

lour, and inclosed a mass of sebaceous matter, penetrated throughout with long fine hair; after removing which, a full-grown incisor tooth was found attached to the fibrous coat."

Treatment of Ovarian Cysts and Tumours.—Bloodletting, mercury, iodine, diuretics, emetics, long-continued friction or percussion, and a variety of other remedies have all been employed in encysted dropsy of the ovaria, and in most cases without the slightest benefit. Though the progress of the disease cannot be arrested by these means, yet the uneasy sensations produced by it admit of considerable alleviation. Inflammation of the cyst, and irritation of the bowels from its pressure, which often arise, may both be mitigated by the occasional application of leeches to the abdomen, by fomentations, and the use of cathartics and anodynes. When the distension becomes great, recourse must be had to the trocar, and by a repetition of the operation of tapping, the life of the patient may be prolonged, and considerable ease and comfort may be thus obtained, under a complaint which sooner or later must terminate unfavourably. On the practice of extirpating the ovaria when diseased, it is not necessary to offer any observations, as it has been abandoned by all who have made themselves acquainted with the pathology of these organs. Several years ago, an eminent accoucheur of this metropolis made an incision through the abdominal parietes of a young woman who had a movable tumour in the belly, which he considered to be ovarian, and which he thought it possible to extirpate, as Mr. Lizars had done in similar cases with success. On laying open the abdomen, a large fibro-cartilaginous tumour presented itself, which was attached to the fundus uteri by a thick peduncle. A ligature was applied round this, and the tumour cut off; but death soon followed in consequence of gangrene taking place in that portion of the bowel which had come in contact with the cut surface. The impossibility of distinguishing ovarian from uterine tumours, where the operation is wholly unjustifiable, was strikingly illustrated by this case.

[Subsequent experience has shown the justice of these remarks. Of late, many operations have been performed by Dr. Clay, Mr. Walne, Mr. Southam, Mr. J. Atlee, and others, and some of them successfully. They are confirmative of views long ably urged by Dr. Blundell, (*Researches, Physiological and Pathological*, Lond. 1828,) and strengthened by additional arguments which he lately furnished to the writer, (*Philadelphia Medical Examiner*, Jan. 27, 1844,) that incisions into the peritoneal sac are not necessarily so serious as has been generally imagined. Still, the difficulty in knowing the exact state of the parts is a formidable objection to the operation. (See Art. *Ovaires*, (Pathol.) in *Diet. de Méd.* xxii. 590; Paris, 1840; by Velpeau. *Edinb. Med. and Surg. Journal*, April, 1844, p. 467. *Brit. and For. Med. Review*, Oct. 1843, and Jan. 1844. *Amer. Journal of the Med. Sciences*, April, 1844, p. 456; and *Medical Examiner*, Aug. 24, 1844.)]

3. **Malignant Diseases of the Ovaria.**—Sometimes the ovarium is affected with encephaloid disease, or it is converted into a large irregular-shaped mass of cysts and tumours, the section of which presents all the characters of hematoid fungus. This fatal affection usually runs its course with great rapidity, and soon after its commencement the constitution of the patient is much more affected than in the organic diseases of the ovaria which have already been described.

M. Andral has accurately described the changes of structure produced in the ovaria by these malignant diseases. "Sometimes," he observes, "these masses are formed of fibrous, cartilaginous, or osseous tissue; in other cases they are almost entirely composed of encephaloid matter. The walls of the cysts are thick, and their cavities gradually enlarge until a tumour is formed, which fills not only the epigastrium, but the whole abdominal cavity. The outer surface of the tumour is unequal; in some points a fluctuation can be felt, while in others it has a hardness and density equal to bone." (*Andral*, Précis d'Anatomie Pathologique, tom. iii. p. 708.)

Dr. Seymour has also described this affection of the ovaria, and has pointed out the connection which often exists between it and cancerous and fungoid diseases in other parts of the body, as the pylorus, lymphatic glands, and even bony and muscular parts. This malignant disease, he remarks, may be recognised during life by the want of nutrition and broken health of the patient; the unevenness and rapid growth of the tumour, the simultaneous enlargement of glands in other parts of the body, and the occasional occurrence of lancinating pains in the part. The latter symptom is not constant. The pulse is quick and feeble, and as the disease proceeds there is hectic fever, and often aphthæ in the mouth, with an inexpressible sense of debility. (Diseases of the Ovaria, p. 61.)

This disease occurs even at an early period of life, and it appears to be excited in some instances by pregnancy, or to be called into activity by the process of impregnation. In the body of a young woman under twenty years of age, Dr. Carswell found on dissection an ovarian tumour of a malignant nature, as large as the gravid uterus at the full period. About five years ago we examined with Dr. Merriman and Mr. Prout the body of a woman about thirty years of age who had died from malignant disease of the right ovarium a few days after parturition. In the fourth month of pregnancy she began to suffer from a constant sense of uneasiness in the hypogastrium, irritability of stomach; the countenance became sallow, and the constitutional powers greatly reduced. The abdomen, not long after, began rapidly to enlarge, and before the end of the seventh month it had attained the size it usually acquires at the full period of pregnancy. An enormous cyst, which contained a dark-coloured gelatinous fluid, was found on dissection adhering to the right ovarium, and within this cyst were observed a number of tumours of different sizes and shades of colour, which when opened presented the true encephaloid or hematoid fungous character.

An interesting case of a similar description, in which the tumour at first offered an impediment to labour, and the performance of the Cæsarean operation was contemplated, has recently been recorded by Mr. Hewlett of Harrow, in the seven-

teenth volume of the Medical and Chirurgical Transactions.

Scrofulous and tubercular disease of the ovaria is very rarely met with. It is the least common of all the morbid alterations of structure to which the human ovaria are liable.

ROBERT LEE.

PALPITATION.—Palpitation may be defined to be an increase in either the force or the frequency of the heart's contractions, or of both, whereby they become not only sensible, but sometimes very troublesome to the patient. They may vary in force, from a scarcely perceptible degree to a violence which amounts to convulsion. Not unfrequently the sound of the beats is audible to the patient, especially when lying on his side; and in this position, the second as well as the first sound may occasionally be distinguished.

As palpitation is, under all circumstances, dependent on over-excitement of the nerves of the heart, the phenomenon is always essentially the same. The varieties which it presents arise merely from differences in the causes, and from the different routes which these causes pursue in order to arrive at, and convey their stimulus to the heart. Thus the blood conveys the stimulus *directly;* and this it does in three ways: first, by arriving in excess, as from violent exercise, plethora, &c.; secondly, by gorging the heart, in consequence of its transmission being impeded by a disease of the organ, or an obstacle in some other part of the circulation; thirdly, by being of too stimulant a nature, in consequence of the diet being exciting. The nerves, on the contrary, convey the stimulus to the cardiac plexus *indirectly*, as is the case in emotions of the mind, in dyspepsia, in hysteria, &c. The nerves and the blood may also convey the stimulus conjointly, as happens in fever, and in all other cases in which morbid nervous irritability co-exists with an organic affection, or a state of the blood leading to palpitation.

We have now to take a more particular view of palpitation in connection with its several causes; and we shall first glance at the causes of a physical or organic nature, and those dependent on states of the blood; and subsequently dwell at more length on nervous palpitation.

I. PALPITATION, CONNECTED WITH PHYSICAL CAUSES.—Of these causes, some are inherent in the heart itself, and others are exterior to it. The causes inherent in the heart fall under the following heads:—

1. Hypertrophy, and hypertrophy with dilatation. In these affections, palpitation consists in an increase both of the force and the frequency of the heart's action, the physical characters of the impulse and sounds being merely an exaggeration of those which the heart presents during a state of calm. (See HEART, HYPERTROPHY OF, and HEART, HYPERTROPHY WITH DILATATION OF.)

2. Dilatation with attenuation. Palpitation in this case consists in an increase of the frequency, but often not of the strength of the beats, though the patient may experience the *sensation* of an increased impulse. Palpitation of this kind is more obstinate than any other. Laennec cites an instance in which it lasted eight days; the pulse constantly beating 160 to 180 in the minute.

3. Disease of the valves. Palpitation from this cause varies in its characters according to the nature, situation, and extent of the valvular affection, and according to the presence or absence of hypertrophy, dilatation, or both. (See HEART, DISEASES OF THE VALVES OF THE.) Obstructions in the arterial system fall under this head.

4. Pericarditis, carditis, and inflammation of the internal membrane. In these, palpitation is either strong and bounding, or feeble, irregular, and unequal; differences which depend on circumstances explained in the articles on the above subjects.

5. Adhesion of the pericardium. Palpitation from this cause is violent, and of an abrupt, jogging, or tumbling character.

The physical causes of palpitation exterior to the heart are as follows:—

1. Acceleration of the circulation by muscular efforts. This is the most simple cause of palpitation, and it is strictly physiological. There is an increase both of the force and the frequency of the beats. Closely allied to this is the next: viz.—

2. Plethora. It gives rise to palpitation by preternaturally distending and stimulating the heart. The palpitation which sometimes exists during the first three or four months of pregnancy, is partly attributable to plethora, resulting from the suppressed catamenia, and partly to the nervous disturbance which attends so important a change in the system as that of utero-gestation.

3. Anæmia, whether from loss of blood, or from an insufficient quantity being made by the patient. In this case, the blood is always attenuated and impoverished, containing more serum and less fibrine than natural. Hence it moves with greater facility in the vessels, and probably, therefore, arrives at the heart either in redundant quantity or with morbid velocity, thus constituting a physical cause of palpitation. A highly irritable state of the nervous system generally accompanies anæmia, and is partly the cause of the palpitation. Hence we shall revert to this subject in treating of nervous palpitation.

4. Convulsive, epileptic, and hysteric fits. These cause palpitation, partly by occasioning too rapid a flow of blood to the heart, and partly by a participation of the organ itself in the spasmodic action.

5. Obesity. This causes palpitation in a threefold way: *a*, by the plethora with which it is usually accompanied; *b*, by the weight and inelasticity of the thoracic and abdominal parietes, whence the free expansion of the ribs and descent of the diaphragm are prevented; *c*, by the unusual resistance offered to the heart's propulsive action in consequence of the extended sphere of the circulation, and the pressure of the adipose tissue on the capillaries.

6. Obstructions in the lungs; namely, hydrothorax, empyema, pneumothorax, hepatization, extensive bronchitis, affecting the minute tubes, &c. These cause palpitation (so far as it is independent of a concomitant febrile movement) by obstructing the passage of blood through the lungs; whence the heart becomes gorged and preternaturally stimulated. Obstructions developed slowly, as tubercles, encephaloid tumours, aneurisms of the aorta, &c., commonly occasion little and sometimes no palpitation. For this there are

two reasons: 1st, that the mass of blood is diminished by the concomitant emaciation; 2dly, that supplementary respiration is established in the previous portions of lung, which not unfrequently become hypertrophous.

7. Asthmatic bronchial constriction. This causes palpitation by preventing the expansion of the lungs, and consequently impeding the circulation through them.

8. Acute laryngitis. According to our observation in a considerable number of cases, this affection causes palpitation in an eminent degree. We ascribe it to the same cause as in the preceding case, 7. In the last stage the palpitation ceases; for the engorgement of the heart becomes so excessive that the organ struggles and flutters rather than palpitates, and the patient, if not immediately relieved, speedily dies of asphyxia.

9. Abdominal infarction: namely, from enlarged liver or spleen, morbid growths, ascites, ovarian dropsy, advanced utero-gestation, &c. These occasion palpitation, principally by preventing the free descent of the diaphragm, and thus obstructing the circulation through the lungs, but partly also by compressing the aorta, and opposing the passage of the blood through it.

Amongst the causes of abdominal infarction is to be ranged tight-lacing. We were consulted by a military officer, who had brought on constant palpitation and slight hypertrophy by the habitual use of the dumb-bells while tightly girthed round the waist.

II. Palpitation from Causes operating purely through the Nervous System.—There are few affections which excite more alarm and anxiety in the mind of the patient than this. He fancies himself doomed to become a martyr to organic disease of the heart, of the horrors of which he has an exaggerated idea; and it is the more difficult to divest him of this impression, because the nervous state which gives rise to his complaint, imparts a fanciful, gloomy, and desponding tone to his imagination. Members of the medical profession are more apt than others to give way to these feelings; partly from their apprehensions being more keen, and partly from an impression too widely prevalent, that there is difficulty in distinguishing nervous from organic palpitation, and, consequently, that the patient must remain in a state of anxious uncertainty. It may be said for the consolation of such, that the diagnosis presents no difficulty, if to general signs is added a knowledge of those afforded by ausculation and percussion.

Nervous palpitation is dependent on dyspepsia, hypochondriasis, hysteria, chlorosis, gout, mental excitement, or a naturally irritable nervous temperament; and it presents different degrees, aspects, and habitudes, according as it depends on one or other of these causes. We shall describe its most common forms, and briefly advert to the connection between them and their causes.

1. The first and slightest degree is characterized by a tumbling or rolling motion of the heart, with a momentary feeling of fulness, tightness, and oppression. It is referable to an intermission of the heart's action, producing congestion; for the removal of which the succeeding beat is inordinately violent. This form occurs principally in dyspepsia, and it may result from so slight a degree of it, that the patient is not conscious of being an invalid. Slight acidity or flatulence, for instance, is sufficient for its production.

Dyspeptics do not in general experience a more aggravated form of palpitation, unless they are of a nervous temperament.

2. In the next degree there is a series of quick, weak, fluttering, irregular beats, with slight anxiety, acceleration of the respiration, and a quivering sensation in the epigastrium: this may last from a few minutes to half an hour or an hour, and occur only at distant and irregular intervals, or several times a day, especially when the patient is startled. It is apt to supervene at bed-time, keeping the patient wakeful and restless during a considerable part of the night.

This form presents itself in nervous and hypochondriacal dyspepsia, in hysteria, and in individuals who, either from disease or mental excitement, have fallen into a state of high nervous irritability. Amongst the latter class are to be ranked literary and scientific men, and hard students in general. This form occasionally, though rarely, occurs without any other apparent origin than a very slight degree of indigestion, the patient being otherwise strong and healthy.

Individuals, especially females, with naturally small or thin hearts,—a class characterized by a delicate frame and a languid, feeble circulation, are predisposed to the variety of palpitation under consideration.

3. The next degree amounts to perfect palpitation, consisting in increased impulse, sound and frequency of the beats, sometimes accompanied with irregularity of action, and generally with more or less anxiety, dyspnœa, and even orthopnœa. The attack may be only occasional, or may occur several times a day, or may even last with little intermission for several days together. This form is rare in pure dyspepsia, but is of common occurrence in dyspepsia complicated with hypochondriasis, or engrafted on a nervous temperament. It manifests itself principally, however, in hysterical subjects, and those remarkable for great nervous mobility and irritability. In a lady of the latter class we have seen it exist in an exquisite degree, being excited by the slightest causes. A word, a look, an idea, a movement, the most frugal meal, the most gentle stimulant, even a glass of water, sufficed to induce a violent fit, attended with heat and flushing; and she frequently passed a great part of the night in a state of the most distressing orthopnœa. The heart and lungs were sound, and she was restored to health by bitters, tonics, cold bathing, sea air, and a nutritious but unstimulating diet.

There are many individuals without any definite ailment, yet calling themselves *delicate* or *not strong*, who, after a full meal, after any unusual fatigue, or any extraordinary mental excitement, become languid, listless, restless, sometimes drowsy, with heat, acceleration of the pulse and respiration, and a more or less extensive arterial throbbing. This is generally connected with slight palpitation; so slight, indeed, that the patient is seldom conscious of it. The symptoms usually subside after a little repose, especially a tranquil sleep.

Sometimes a slight degree of palpitation subsists

without intermission for years, especially in young persons of a constitution at once plethoric and nervous, and more particularly in females about the period of puberty.

We above adverted to palpitation from anæmia, whether occasioned by loss of blood or by defective sanguification. In this the blood is always in a thin and impoverished condition, from a deficiency of fibrine and an excess of serum, and the nervous system is generally in a highly irritable state. The variety is highly important, as it comprises a great number of cases, and requires a peculiar mode of treatment.

When the palpitation results from loss of blood, the phenomenon is denominated *reaction*. If the hemorrhage has been restricted to a brief period, as a few hours or days, the patient soon recovers; but if it has been protracted, as is often the case from piles, chronic dysentery, menorrhagia, polypus, or cancer of the uterus, &c. the case is much more obstinate and intractable; for not only is the state of anæmia fully established, in consequence of the system being reduced to a condition which renders it incapable of reproducing good blood; but, by the impoverished state of the fluids, a train of nervous symptoms is engendered, which greatly exasperates the malady. Under these circumstances we have repeatedly seen palpitation last almost without intermission for many weeks and even months, but gradually yield to tonic medicines, diet, and regimen.

Anæmia arising simply from defective sanguification, as in chlorosis, of the male as well as the female, places the patient in circumstances very similar to those last described; and the palpitation is of the nature above noticed as the third degree. Here, also, we have seen it last, with little intermission, for several weeks and even months. In a medical gentleman, the heart bounded violently 120 to 150 times per minute for upwards of four months. Bleeding exasperated the affection, and the blood drawn was very serous, and so deficient in fibrine as scarcely to form a coagulum.

This state of the blood, in connection with palpitation and arterial throbbing, constitutes, in our opinion, an important feature in the pathology of purpura hemorrhagica; for in several well characterized cases which we have seen, and in others which have been communicated to us, the conditions alluded to existed in an eminent degree.

Nervous palpitation may give rise to hypertrophy, (see Hypertrophy, *exciting causes*;) but it is surprising how long the heart will in most cases resist this affection; and when the palpitation is subdued, how soon it will recover itself after undergoing slight enlargement. According to our observation it rarely requires less than a year, and sometimes several, of very constant palpitation, to produce confirmed hypertrophy.

Every variety of nervous palpitation may be attended with arterial throbbing; and the throbbing may be either universal, or limited to a particular part, even to individual arteries, especially the aorta and carotids. Hence, nervous palpitation is, in general, more audible to the patient than *organic*, the sound appearing to rush through his ears, especially when he reposes on his side in bed, since each arterial throb causes a rustling movement of his pillow.

The contraction of the heart in nervous palpitation is less remarkable for force than for an abrupt, bounding, and jerking character, and on this the arterial throbbing is mainly dependent; since the vessels receive the jerk communicated to the blood by the impulse of the heart. (Treatise on Diseases of the Heart, by Dr. Hope, page 74 to 78.)

Diagnosis of Nervous Palpitation. 1. *General Signs.* — Nervous palpitation may be discriminated from organic by the presence of some or all of the following signs, viz. by its not being excited, but, on the contrary, relieved by corporeal exercise of such a nature as would certainly disturb the action of a diseased heart; by its disposition to supervene while the patient is at rest, especially at the commencement of the night when he lies wakeful in bed; by a fluttering in the epigastrium; by the general prevalence of nervous symptoms; by the affection being aggravated when the nervous symptoms undergo an exacerbation; by the pulse and the action of the heart being natural during the intervals between the attacks; and by the intervals being long when the general health is good. Nervous palpitation, in short, is *intermittent*, its causes being only occasional; whereas organic palpitation deserves the epithet of *continued*, its causes being constant.

To the above category of diagnostic signs, some add, as characteristic of nervous palpitation, an increase of it after meals, or when the stomach is loaded or deranged, and an amelioration produced by dyspeptic remedies; but as the stomach produces the same effects when there is disease of the heart, these signs are not pathognomonic of nervous palpitation. To this point we would particularly direct the attention of practitioners; because many, in forming their diagnosis of the affections in question, regard the dyspeptic signs as paramount in value to all others.

Though nervous palpitation is often attended with various familiar nervous affections of the head, as pain, or sensations of heat or cold confined to particular parts and coming and going suddenly, temporary vertigo, tinnitus, and confusion of the sight, not increased by lying down or stooping; it is not, when purely nervous, accompanied with genuine signs of cerebral determination or congestion: there is no universal throbbing headach, with weight and tension, increased by stooping or the recumbent position; no stunning sounds and pains in the head on suddenly lying down or rising up; no permanent somnolency, apoplectic stupor, or regular apoplectic fits, as in hypertrophy, &c.

2. *Physical Signs.*—"In nervous palpitation," says Laennec, "the first impression which the application of the stethoscope to the region of the heart produces on the ear, shows at once that this organ has not great dimensions. The sound, although clear, is not loud over a great extent; and the shock, even when it at first appears strong, has little real impulsive force, for it does not sensibly elevate the head of the observer. This last sign appears to me the most important and the most certain of all, when we add to it the *frequency* of the pulsations, which is always greater than in the natural state. Most commonly it is from eighty-four to ninety-six per minute." This is a

very accurate description of nervous action of the heart. The impulse is analogous to that which occurs in reaction from loss of blood, and which we have elsewhere denominated *jerking*. It may be added that, in nervous palpitation, though the sounds are increased, they are not materially altered in quality, the first sound being, as in the healthy state, longer and more suppressed than the second.

The physical signs of nervous palpitation will be rendered more apparent by being contrasted with those of organic. We shall, therefore, summarily recapitulate the latter.

In *dilatation*, dullness on percussion over an increased extent indicates that the organ is enlarged; further evidence of which is derived from the dullness, and the impulse being situated lower down than natural. The first sound is short, smart, and clear, resembling, and in dilatation with attenuation becoming identical with, the second. Both sounds are louder than in a greater degree of nervous palpitation.

In *hypertrophy with dilatation*, the dulness on percussion is increased over a still greater extent, and the dulness and impulse are also lower down than natural. Both sounds are very loud, and the first is shortened, though less so than in pure dilatation. The impulse is a smart, violent blow, possessing much more force than in nervous palpitation, and very frequently raising the head of the auscultator.

In *simple hypertrophy*, the impulse is a slow, gradual, and powerful heaving, very sensibly elevating the head. Both sounds are diminished, and in extreme cases almost suppressed. These characters are so different from those of nervous palpitation, that it is only by inattention that the two affections can be confounded.

In *disease of the valves* there is a *permanent* bellows, sawing, or rasping murmur; whereas murmur in nervous palpitation is only occasional, and of a soft character. If the valvular contraction be great, the action of the heart is irregular. Irregularity also occurs in nervous palpitation, but it is not accompanied by those symptoms of an embarrassed circulation which invariably attend valvular disease, and in too palpable a form to be mistaken. Should hypertrophy, dilatation, or both, coexist with valvular disease, their signs, as above described, will likewise be present.

The pulse in nervous palpitation is materially different from that in organic disease. In the former it is jerking, but has little fulness, strength, and incompressibility. In dilatation it is full and soft; in hypertrophy with dilatation, it is full, strong, and sustained; and in simple hypertrophy, though less full, it is strong, sustained, and even hard. In valvular disease it presents different characters according to the situation and degree of the lesion, (see VALVES, DISEASES OF, *general signs*,) but the presence of other signs of the valvular affection will enable the practitioner to distinguish the pulse from that of nervous palpitation.

To the physical signs of nervous palpitation, may, in many instances, be added an intermittent bellows and sawing murmur of the heart and sometimes of the arteries, which we have elsewhere attributed to the morbid velocity with which the blood is propelled by the sudden and as it were spasmodic contraction of the heart. (Treatise on the Diseases of the Heart, by Dr. Hope, p. 76,) The murmur occurs whenever the action of the organ is excited; and in some instances the slightest causes suffice to produce the effect, as a momentary mental emotion, a change of posture, (from the recumbent to the erect for instance,) a constrained position, a meal, flatus in the stomach, &c. We have often found the phenomenon to subsist for a few seconds or minutes only, that is, so long as the exciting cause continued in operation. The patient, if asked whether he is conscious of palpitation, replies in the affirmative; yet the pulse may not be strong—it may even be small and weak; but it will be sharp or jerking. It is the velocity, therefore, and not the power of the heart's contraction which causes the murmur.

III. PALPITATION FROM PHYSICAL AND NERVOUS CAUSES.—Nothing is more common than a conjunction of nervous with organic affections of the heart; and these are the cases which present the greatest difficulty in diagnosis, as the one masks the other, and it is not easy for the inexperienced practitioner to assign to each the share which it holds in the production of the symptoms. He will best qualify himself for this task by acquiring a sound knowledge of the two classes of affections separately. Hence it is unnecessary to enlarge on this subject. We have elsewhere given cases illustrating the combination. (Treatise, &c. p. 493.)

Treatment of Palpitation.—Palpitation being only a symptom, the treatment must be mainly directed to the primary affections. To advert to it here in all its details would be a superfluous repetition, as it is discussed at large in the several articles devoted to the primary affections. Palpitation from organic disease of the heart is so intimately connected with the disease itself, that abstract observations on treatment would convey no definite information; and we therefore refer the reader wholly to the various articles on that subject—to which he will find a guide in the general article, HEART, DISEASES OF THE. The treatment for nervous pulsation of the aorta is noticed at the conclusion of the article AORTA, ANEURISM OF THE. In the articles HYSTERIA, CHLOROSIS, and especially INDIGESTION, he will find ample information on the subjects to which they respectively refer. Here, therefore, we shall merely direct our attention to a few points, which, though embraced in a general plan of treatment for the primary affection, are not discussed with so specific a reference to palpitation as the practitioner might probably wish.

1. *Palpitation from Plethora.*—This is to be treated in the first instance by a free use of the lancet, and by two or three calomel and colocynth purges at bed-time, worked off by a draught consisting of equal parts of infus. gentian. and infus. sennæ c. with tinct. sennæ ʒi. and potassæ tartrat. ʒi. ad ii. or any other purgative neutral salt. This draught should be repeated every morning for a week or ten days, until the force of the palpitation has in a great measure subsided. The subsequent part of the treatment is principally of a prophylactic nature, the indication being to prevent the regeneration of too much and too rich blood. The patient should abstain from animal food on alternate days, and should always take it in limited

quantity. His diet should consist principally of farinaceous articles and vegetables, and his beverage should be toast and water. As few things are more conducive to plethora than an excessive indulgence in sleep, he would do well to restrict himself, for a time at least, to six or seven hours in the twenty-four, or even less. While the palpitation exists, it is dangerous to take violent corporeal exercise, as hypertrophy might be induced; but when the symptom seems to be provoked by exertion, an active life is eminently serviceable. We have thought it necessary to insist on the present subject, as we have found plethora to be a frequent cause of hypertrophy, especially in those who, while plethoric and subject to palpitation, are compelled by their position in society to lead a laborious life. Such is the case with a large class of female servants in the country. The luxurious and indolent, when plethoric, suffer in a scarcely less degree.

2. *Palpitation during early utero-gestation.*—Should this be evidently connected with plethora, it will readily yield to a moderate abstraction of blood, a few gentle saline aperients, a spare, unstimulating diet, and a cool air with good ventilation.

3. *Dyspeptic palpitation.*—As the palpitation generally supervenes at the moment when there is a morbid stimulus in the stomach, whether this result from ill-digested food, as is usually the case in atonic dyspepsia, or from the irritation of almost any ingesta in the inflammatory species, it is evident that a judicious regulation of the diet will constitute one of the most important features in the treatment. To the article INDIGESTION the reader has already been referred. He will there find an able account of the medical treatment adapted to all the circumstances of the complaint. So long as palpitation exists in connection with symptoms obviously demanding the exhibition of medicines, as, for instance, inflammatory irritation of the mucous membrane, complete torpor of all the alimentary functions, and with various others, it is vain to expect a cessation of the palpitation until these symptoms have been relieved. But palpitation not unfrequently remains after all urgent symptoms have been removed, and the patient scarcely looks upon himself in the light of an invalid. Often have we seen it form the most delicate test of the slightest dietetic indiscretion. Here, then, it is that diet and regimen are of the first importance: they must complete what medicine began.

They are to be adapted to the nature of each case, and to vary with the variations of its circumstances. In *atonic* gastric dyspepsia the patient should follow the rules judiciously laid down in INDIGESTION, ii. p. 619 et seq.

At p. 620 is also an excellent account of the means to be employed in order to restore the harmonious action of the bowels with the stomach, of restoring or increasing the activity of the excretory organs, and of restoring the tone or improving the innervation of the stomach. Under the latter head the subjects of mineral waters, bathing, friction, clothing, are fully discussed.

In *inflammatory* gastric dyspepsia, not only the medical, but the dietetic and regiminal treatment is very different. Both will be found in the same article, p. 627, so ably laid down as to supersede the necessity for further remark.

4. *Palpitation from anæmia.*—When this results from a sudden loss of blood in a healthy individual, little more is requisite for its cure than patience, as the symptom subsides in proportion as blood of the natural consistence is regenerated, which takes place in the course of ten days or a fortnight, and sometimes considerably earlier.

When the anæmia results from protracted or repeated hemorrhage, or from inadequate sanguification, as in chlorotic females, persevering medical treatment is in general necessary. The palpitation, and its usual concomitants, headach and arterial throbbing, are invariably exasperated by further detraction of blood, to which some resort from a mistaken view of the nature and cause of the headach. More and richer blood must be made, and the remedies best calculated to effect this object are the preparations of iron, with aloes; the latter being useful not only as a bitter tonic, but by its aperient operation to counteract the too stimulant effect of the chalybeate. We have seldom been disappointed by the pills of Dr. Abercrombie, consisting of two grains of sulphate of iron, two of aloes, and five of the compound cinnamon powder in two pills, taken at dinner, and, if necessary, at bed-time also, the quantity of aloes being diminished if it should act more than once, or gently twice a day. Should these pills create nausea, as sometimes happens, an excellent substitute is to be found in the decoct. aloes comp. f.℥ss ad f.℥i (just sufficient to move the bowels gently once a day) at bed-time, with a drachm of the vinum ferri thrice a day.

The carbonate of iron in doses of from one to three drachms thrice a day, and two grains of the pil. aloes cum myrr. and pil. galbani comp. respectively at bed-time, is likewise an efficacious plan of treatment. Under the use of all these remedies we have seen patients speedily recover from the most unpromising circumstances. The remedies are to be assisted by a nutritious animal diet, much fresh air and gentle exercise, and by the use of the flesh-brush, salt-water sponging, and even shower-bath.

Before the medicines begin to take effect, the patient is often importunate for some palliative to relieve the urgency of the palpitation. We have found this object best effected by the hydrocyanic acid (*m* i. ad vi.); the acetate of morphia (gr. 1-3); or by the following draught: tinct. hyoscyami ℥ss, sp. ætheris nitrici ℥ss, mist. camph. ℥x. syrupi aurant. ℥i. Fiat haustus. Each remedy may be administered once, twice, or thrice a day, according to the necessity.

5. *Nervous palpitation.*—Individuals in whom palpitation is referable to a highly irritable nervous temperament, cannot, in general, bear the stimulus of chalybeates in the first instance, though they eventually prove of the greatest advantage. With such, it is best to commence with the lightest bitters, and pass progressively to bark and mineral acids, and thence to metallic tonics. Of these sulphate of zinc is one of the least stimulant, and a grain, with extract of gentian, in a pill twice or thrice a day, will often agree as well even as bitters. In the cases in question, however, medicines are of far less importance, in the first instance,

than regiminal tonics: viz. a bracing air by the sea-side, sea-bathing, the shower-bath, or salt-water friction, a regular, nutritious, but unstimulating diet, and a tranquil cheerful mind. After preliminary measures of this kind for a few weeks, chalybeates, especially in the form of mineral waters, will in general prove singularly beneficial.

J. Hope.

[Not unfrequently, cases of irregularity of the heart's action, especially of the rhythm, are met with, which appear to be greatly dependent upon a want of nervous power generally, and of the nerves distributed to the heart in particular. These cases are often the source of great anxiety to the patient. Auscultation may exhibit no evidence of valvular derangement or of altered nutrition of the organ; but a loss of beat is observed occasionally at the wrist, whilst, at the same time, the impulse of the heart may be exaggerated. This pathological condition is often accompanied by languor, and by irregularity of calorification,—the hands and feet being kept warm with difficulty; and, occasionally, immediately after the irregularity of the heart's action is felt in the epigastrium, the patient breaks out into a profuse perspiration. Along with these phenomena he is affected with flatulence of the stomach and bowels, and, in many cases, the anomalous symptoms are present, which have been referred to as belonging to Torpor of the Colon (q. v.). The subjects of these cases are often gouty.

The treatment ought to consist of agents that are calculated to obviate debility and impressibility. The preparations of iron—as the citrate—in full doses are of great service; and a glass or two of wine at dinner, or of ale or porter, with animal food in due quantity, has afforded marked relief.

Robley Dunglison.]

[PALSY. See Paralysis.

PALSY, BELL'S. See Paralysis.

PALSY, SHAKING. See Paralysis.]

PANCREAS, DISEASES OF THE.—By the ancient writers on medicine, the use and the importance of the pancreas were, it is to be presumed, little thought of; for the venerable father of our art has not even named an organ concerning whose office such a variety of opinions were advanced in after ages. Of these opinions a short yet lucid account has been given by De Graaf. (Tractatus Anatomico-Medicus de Succi Pancreatici Natura et Usu, cap. 2.) Up to the period when the pancreatic duct was discovered by Wirsangus, the notion most generally adopted seems to have been this,—that the office of the pancreas was to afford support to the vessels, and to serve as a cushion or bolster to the stomach, to protect the latter, when in a state of repletion, from being pressed and injured by the vertebræ.* In latter times, however, it has been clearly ascertained to be an important gland. Its office, we now know, is to secrete a fluid analogous to the saliva, (hence it has, by Haller and other eminent physiologists, been called a salivary gland,) and to transmit by its excretory duct that fluid to the duodenum. The pancreatic juice, mixing with the bile, probably renders it more bland; and by the agency of the pancreatico-bilious fluid, combined with the lymph of the intestines, the food, already converted into chyme in the stomach, is further changed and becomes chyle, the pabulum of the blood, which has emphatically been termed *the life*.

It is worthy of remark that many eminent persons who were ignorant of the true physiology of the pancreas, who were unacquainted with the existence of its peculiar secretion, yet considered it to be the secret source of a variety of important maladies. Thus Schenkius says that the pancreas and mesentery are the seats of innumerable and wonderful diseases; (Exercit. Anatom. lib. i. sect. 2, cap. xxi.) and Fernelius (Lib. vi. pathol. c. 7,) treating of the morbid affections of the same parts, affirms that in them he has generally observed the causes of diarrhœa, dysentery, cachexia, atrophy, languor, slow fevers, &c. Riolanus again supposes the pancreas to be the obscure seat of intermittents, of hypochondriasis, and of other chronic disorders.

Important, however, as the office of this gland is known to be at the present day, we cannot ascribe to it an influence so extensive and so powerful as these old and most respectable writers were disposed to assign to it, at a period when its functions were very imperfectly or not at all understood. The morbid conditions to which the pancreas is subject are in fact not numerous. Dr. Baillie remarks that it is upon the whole less liable to disease than any other important gland in the body. (See his posthumous volume, p. 207.) The symptoms of its disease are moreover obscure, being for the most part such as belong equally to morbid affections of other parts contained within the abdominal cavity. It is, indeed, very seldom that we are able to discover pancreatic disease in the living subject, and rarely do we find, upon examination after death, that this gland has been the only or even the principal seat of disease.

[There is reason to believe that a close relation and intimate sympathy exist between the salivary glands proper, and the abdominal salivary gland or pancreas; and it would seem that there is a sympathy between the testes and pancreas (See art. Parotitis; and Dr. F. Battersby, in Dublin Journal of Med. Science, May, 1844, p. 238). It is, on the average, about six or seven inches long, and weighs from two and a half to three or four ounces. Of six observed cases, the mean weight, according to Professor Gross (*Elements of Pathological Anatomy*, ii. 357, Boston, 1839,) was two and a half ounces, and the mean length seven inches.]

The deviations of the pancreas from the healthy state have been regarded by several authors of high reputation as either of very small moment, or as far too obscure to be recognised with any tolerable degree of precision. Of all those whose Genera Morborum are comprised in Cullen's Synopsis, Vogel alone says one word about the pancreas, and he barely notices its inflammation—adding the words, 'notæ deficiunt.' In the comprehensive and valuable work of Dr. Mason Good, we meet with nothing respecting the diseases of the gland in question. Yet though the opinion of Dr. Baillie above referred to may be

* Such was the notion of the celebrated Vesalius.

perfectly correct, and though reading and experience may have forced upon us the conviction that the diseases to which the pancreas is liable can hardly be ascertained during life, or, at all events, cannot be ascertained until they have proceeded too far to receive any substantial benefit from medicine, still, in a work like the present, the morbid affections of so important a part must not be passed over in silence. We proceed, therefore, to offer such an account of those morbid affections as the perusal of some of the best authors, conjoined with our own (it must be confessed very limited) observations, enables us to supply.

Inflammation of the pancreas is a disease of rare occurrence, at least it has seldom been described by morbid anatomists. A recent instance, however, of what would appear to have been true inflammation of the gland, has been given in the Medico-Chirurgical Transactions, (vol. xvi. part 2,) upon the high authority of Mr. Lawrence. In the case to which we refer, the pancreas was throughout of a dull red colour, which contrasted very remarkably with the bloodless condition of other parts. It was externally firm to the touch, and upon being cut into felt very firm and crisp; but after having been left for eight-and-forty hours it became soft. Mr. Lawrence does not seem to regard this hardness as a morbid condition of the gland, and for the following reasons:—1st, because persons in whom such a state of the pancreas has been observed have died of other diseases, without a symptom of morbid affection of this particular part having developed itself during life: 2dly, because in these cases the structure of the gland has been in every respect perfectly healthy; and 3dly, because the hardness soon disappears after death. With all respect, however, for the opinion of so experienced a morbid anatomist and so acute an observer as Mr. Lawrence, we cannot altogether coincide with him in his reasoning upon this point—we do not feel satisfied that the induration in question is not a morbid state. The pancreas is by no means the only important organ which may be seriously diseased, and yet during the life of the patient betray no symptom of such disease, and the individual die at last of some other malady. Induration of other organs may be discovered upon dissection—such induration as has been always deemed to be unequivocally morbid—yet it shall disappear not many hours after death. Such we have known to be the case as regards the liver. We have met with at least one example of enormously hypertrophied and indurated liver, where the induration was lost a few hours after its removal from the body. Mr. Lawrence's strongest argument is the otherwise healthy condition of the pancreas; but Mr. Baillie, while he remarks that hardness of this gland is accompanied with little appearance to the eye of its structure being altered, proceeds to observe that he believes this hardness to be the beginning of a process by which the pancreas becomes truly scirrhous. "It very seldom," he says, "in this state shows, in any part, the real scirrhous structure, but I have seen this to be the case, which renders it very probable that the one is the beginning of a change into the other." (See Morbid Anatomy.)

More frequently than with inflammation of the pancreas do we meet with what are usually regarded as its consequences. Examples of **abscess** and **ulceration** are to be met with in various authors. In the writings of Tulpius, and Bartholinus,* and Guido Patin, as cited by Dr. Abercrombie, (Pathological and Practical Researches, &c. Pathology of the Pancreas,) an immense abscess was found occupying the whole of the gland. Portal relates several instances of this disease, and one especially deserves notice, in which the pancreas was found in a complete state of suppuration, in a man who died suddenly after two or three attacks of vomiting followed by syncope: he had previously been suffering under a paroxysm of gout from which he was supposed to be recovering. (Portal, vol. v. p. 551 et seq.) Another case has been recorded by Dr. Percival. Dr. Baillie never saw but one case of pancreatic abscess, and that case did not occur in his own practice, but was under the care of the present Dr. Heberden.

Gangrene of the pancreas has been mentioned by Bonetus, Portal, and others.

Remarkable instances of **scirrhus of the pancreas** are also on record. Riolanus found the gland in such a state, and equalling the liver in size, in the person of Augustine Thuanus. Morgagni (Epist. xxx. 10) relates a case where the pancreas was of unusual magnitude, and universally unequal with round tubercles of considerable size, and itself of almost cartilaginous hardness. Similar examples may be found briefly related by Dr. Abercombie. (See his work above cited.) Several cases have also occurred to the writer of the present article in which the pancreas *seemed* to be preternaturally hard; but he has met with but one instance where the gland was decidedly and greatly indurated, almost as hard as cartilage. The subject was a young married lady, who, after having for many years suffered from intense pain of head, died with immense effusion in the ventricles of the brain. The abdomen was examined in consequence of her having, a short time previous to her death, complained of excessive pain in the epigastric region. No morbid appearance was discovered, excepting the extraordinary induration of pancreas above mentioned.

Cancer of the pancreas has sometimes been noticed. De Graaf (Tractatus, &c. cap. vii. See also Bonetus, de vomitu observ. 55) has a striking case from the Miscellanea Curiosa, Med.-Phys. Germanorum. It occurred in the person of a surgeon. The pancreas, which had perforated the diaphragm, was two spans long, and two hands in breadth; it was decayed and putrid—an ulcerated mass, resembling cancer. In this case not only was the diaphragm perforated, but the spine was eroded, and the vena cava had given way. The cancerous mass had spread further, and had contaminated both kidneys, rendering them putrid and excessively black.

We are not aware of the existence of a symptom or set of symptoms by which inflammation of the pancreas can be ascertained in the living sub-

* See also Fabricius (Wm.) cent. 4, obs. 71. Antest Program. to the treatise of Fernelius, "de abditis rerum causis"—De Graaf 'de Succo Pancreatico,' cap. vii. case cited from Highmore.

ject, nor are those which attend ulceration or scirrhus of that gland by any means well defined. The pancreas, says Dr. Pemberton, (Diseases of Abdominal Viscera,) is endowed with so small a degree of sensibility that ulceration is found after death, when no pain or other symptom had previously existed which could lead to a suspicion that inflammation was going on. If, however, there be a sense of weight or deep-seated pain in the region of the stomach, or referred to the back, with vomiting* of ingesta and of watery fluid; if there be gnawing pain at the boundaries of the thorax and abdomen, urgent thirst, and emaciation,† and yet no perceptible tumour in the hypochondria, nor other symptom, in addition to those just mentioned, to mark an original disease of the stomach, or concave surface of the liver, or of the gall-bladder or ducts, or of the small intestines, or, we may add, of the kidneys, we may safely conclude that the seat of disease is the pancreas.

When disease has so far advanced that the emaciation is extreme, the indurated gland may be distinctly felt: by placing one hand upon the back and the other upon the stomach, and employing considerable pressure, an expression of pain deep-seated under the hand will in all probability be elicited from the patient.

But, besides the diseases already mentioned, the pancreas is subject to certain other morbid affections. Thus, while tubercle of the gland is mentioned by Morgagni, (Epist. xxxiii. art. 28,) a case of tuberculated sarcoma is related in the Medico-Chirurgical Transactions, (vol. ix. part ii. p. 342;) Dr. Abercrombie has given several instances of a mixed state of disease—of hypertrophy, with partial induration and partial softening, resembling medullary sarcoma. (Pathological and Practical Researches.) "Many cases," says the latter author, "are on record, of chronic disease of the pancreas, exhibiting the same diversity of symptoms which occurred in the examples now described, and nearly in the following proportion. Of twenty-seven cases, which I find mentioned by various writers, six were fatal with gradual wasting and obscure dyspeptic symptoms, without any urgent symptoms; in eight there was frequent vomiting, with more or less pain in the epigastric region; and thirteen were fatal with long-continued pain, without vomiting. In some of these the pain extended to the back, and in others it was much increased by taking food. In several there were dropsical symptoms, and in three or four there was jaundice from the tumour compressing the biliary ducts. In the morbid appearances, also, there was great variety."

Calculous concretions have been found in the pancreas. Instances of this have been given by De Graaf, Portal, Baillie, &c. The calculi in Dr. Baillie's case were found to consist of carbonate of lime. (See Baillie's Morbid Anatomy; Pemberton on Disease of Abdominal Viscera; Abercrombie.)

The pancreas, it is said, has been entirely wanting; but we doubt the fact: we believe that in the cases adduced some portion of the gland existed. The entire pancreas, as Haller observes, cannot be removed without the duodenum.‡

After what has been said respecting diseases of the pancreas, of the great obscurity of their symptoms, &c., it cannot be expected that any thing very satisfactory can be proposed as to their treatment. To use the words of Dr. Pemberton, "the remedies for a diseased pancreas are as imperfect as the symptoms which mark its derangement." Could we even be assured that the pancreas is the primary or the principal seat of disease, we should still perhaps be at a loss how to meet the mischief by strictly appropriate remedies, and as, in the present state of our knowledge, we never can decidedly pronounce that the gland in question is the chief seat of disease, our practice must necessarily be vague; it must necessarily be directed to symptoms which belong equally to morbid affections of other organs as well as to those of the pancreas. Pain we must attempt to relieve by leeches, or cupping, or blisters. We must endeavour to restrain the efforts to vomit, and we must secure at least one regular evacuation daily. Of the remedies calculated to allay the irritable condition of the stomach which accompanies disease of the pancreas, a great variety might be mentioned: we select the following, simple indeed, but often very useful:—first, a drachm of tincture of senna with five minims of laudanum, to be taken a quarter of an hour before each meal;§ secondly, pulv. calumb. et pulv. rhei āā gr. v., sodæ subcarb. gr. v., pulv. capsici gr. ss., in any convenient vehicle just before dinner; or gr. v. of the compound rhubarb pill may enable the stomach to retain a portion, at least, of the food, which would otherwise be rejected altogether. Of the other numerous remedies which are commonly employed in derangement of stomach, we need say nothing in this place. They may each prove occasionally useful, but they more generally fail even to palliate the symptoms when the pancreas is in fault.

The bowels may be regulated by mild laxatives. The plan of certain old practitioners is not to be despised. When they met with cases in which pain of stomach or of some neighbouring viscus was chiefly complained of, yet no good evidence existed of actual disease of any particular part, they gave an opiate draught at bed-time, and a common laxative in the morning. This practice was, we believe, at least as useful as any of the more scientific plans which have been adopted in later times. The patients probably lived as long and their days were as comfortable as they have been under modern treatment.

In one word, respecting diseases of the pan-

* The diseased pancreas may in various ways occasion vomiting; by irritating the contiguous stomach by its hardness or roughness, or by pressing upon it by its preternatural size; or it may compress the duodenum. Or the vomiting may be caused by the secretion of the gland being vitiated by its being deficient, or altogether suppressed. It is said that dogs, whose pancreas has been removed, have died of bilious vomiting.

† There is an observation of Prosper Alpinus which we must not pass over in silence. Speaking of inflammation of the omentum, mesentery, and *pancreas*, he says, "Necessario prædictarum partium insensibilium phlegmone oppressi in expirando angustiam sentiunt."—*De Medicinâ Methodicâ*, lib. vii.

‡ Utilitatem magnam (pancreatis scilicet) perpetuitas suadet, quâ pancreas in plerisque animalibus reperitur; *neque refutant pauca experimenta, in robusto animali facta, quod particula pancreatis extirpatæ vitale superfuit, totum enim pancreas auferri nequit, nisi cum duodeno.*—Haller Primæ Lineæ Physiologiæ.

§ In the distressing nausea and vomiting attendant upon the early stage of pregnancy, the above is a very excellent remedy.

creas, we think that, in their earlier stages, when they cannot be exactly ascertained, our practice must be in a great degree empirical; when they have reached that point that they can be pretty accurately ascertained, little or nothing can be effected, nothing probably in the way of cure, little by way of arresting the progress of the disease. Still, however, it is our duty to recommend an alterative course of medicine; at any rate we may palliate the more distressing symptoms; we may, as in various other hopeless maladies, render the closing days of our patients comparatively comfortable.

[Various diseases have been ascribed to an increased secretion, or hypercrinia of the fluid of the pancreas,—cases of enterorrhœa, for example; and it was suggested by M. Dupuytren, whether the pancreas may not furnish the matter evacuated by persons labouring under cholera. It has, moreover, been presumed by M. Mondière, (*Recherches sur l'Histoire Pathologique du Pancréas*, in *Archiv. Général.*, Mai et Juillet, 1836,) that the fluid of pyrosis may proceed from the pancreas; and, as remarked elsewhere, (*Practice of Medicine*, 2d edit. i. 581, Philad. 1844,) we cannot say that these speculations are altogether devoid of foundation, or that they are irrational; but it may be averred with safety, that the observed phenomena and arguments in their favour are by no means convincing. (See on the Diseases of the Pancreas, Art. *Pancréas*, (Path.) in Dict. de Médecine, xxiii. 68, Paris, 1841.)]

H. W. Carter.

PARALYSIS, from παράλυσις, *debilitas*, *resolutio nervorum* of Celsus.

At an early period of the history of medicine it was a surmise of Galen that two different states or degrees of nervous influence were requisite to supply sensibility and the motive power to any part of the body; but it was reserved to the present century to enlarge upon this idea, and by careful induction from facts disclosed by minute anatomical investigation, from the results of direct experiment and from the effects of certain pathological conditions, to infer that parts endowed with sensation and voluntary motion are provided with two classes of nerves, the one *sentient*, the other *motive* nerves.

If a part be deprived of the influence of one or both of these classes of nerves, from whatever cause, and to a greater or less degree and extent, that part is reduced to the condition indicated by the term *paralysis*, which we accordingly define as the total loss or diminution of sensation or motion, or of both.

Arctæus was the first of the ancients to employ the word paralysis to any extent, but he limits its signification to denote merely a loss of the power of motion, (κίνησιος μοῦνον ἐνεργείης τέ πάρεσις.) The term occurs only once in the writings of Hippocrates, and then in a letter to Perdiccas—de structurâ hominis. By him, and by many writers after him, apoplexy and paralysis were confounded together, and even by Heberden they have been considered as only different degrees of the same disease.

It is with much justice that Rostan has reprobated the custom of considering the condition of paralysis as a disease in itself, when it undoubtedly should be regarded as a phenomenon belonging to and dependent on a number of different affections; and it is much to be questioned whether such a species as that given by Rachoux, (Dict. de Médecine, Art. Paralysie,) viz. *idiopathic paralysis*, is at all admissible.

From the definition above given, it is obvious that those parts which are naturally endowed with sensation and the power of motion can alone be deemed susceptible of the paralytic state. We cannot, therefore, apply the term to that condition of a secreting organ when it is incapable of performing its function, as some writers have done when they speak of paralysis of the kidney, liver, or pancreas, &c.

From the definition we may further infer a primary division of paralysis into that of *sensation*, or *anæsthesia* (ἀναισθήσιη), and that of *motion* (ἀκινήσια), each of which may vary in degree, and may be therefore *complete* or *incomplete*.

[Paralysis of Sensation.]—Although the term *anæsthesia* seems to have originally been applied by Arctæus to denote absence or defect of the sense of touch, there is no reason, from the etymology of the word, why it should not be more extensively applied to signify absence or defect of sensation in general. Adopting this broader signification, then, we place under this head those affections of the senses which are denominated *amaurosis*, *anosmia*, *cophosis* or *dysæcia*, *ageustia*, as the sight, smell, hearing, or taste, may be severally deficient, and finally paralysis of the sense of touch, which is specially denominated by some *anæsthesia*.

For full details respecting **Amaurosis** we refer to the article under that head. (See Amaurosis.)

Anosmia (loss of smell), rarely exists as a solitary complaint, except it be occasioned, as we believe it generally is, by an abuse of sternutatories. It is sometimes a congenital defect, an instance of which is mentioned by Dr. Good, in the person of a young lady. Another instance is known to the writer, in the case of a gentleman, now past the age of fifty.

Tumours compressing the olfactory nerves, organic alterations of their roots, acute affections, or long-continued irritation of the Schneiderian membrane, polypi, disease of the spongy or other bones of the nose, external injuries, may be enumerated as the principal causes of anosmia. Serres alludes to several cases of disease of the roots of the olfactory nerves affecting the sense of smell, and seems to think that alteration of the external root exerts a more powerful influence than that of either of the others.

The cure of this affection is accomplished by the removal of the above-mentioned causes, and is attainable only so far as that object can be effected.

Cophosis (*deafness*) is not an uncommon symptom in fevers, or in acute diseases in which there is disposition to head affection. Disease or compression of the auditory nerve—disease of the petrous bone—obliteration of some of the canals or passages connected with the auditory apparatus—otitis—are among its most usual causes. There are likewise cases of nervous deafness, as Mr

Saunders designates it, dependent on constitutional causes, producing temporary derangement of the functions of the auditory nerve.

If the deafness depend on obstruction, it is of course submitted to surgical treatment; but if it be merely a functional derangement, topical counter-irritation and a general tonic treatment have been generally found successful in the early stage.

Ageustia (*loss of taste*) sometimes accompanies local palsy of the tongue or of the face, and sometimes is produced mechanically by the deposit which covers the sentient surface of the tongue in fevers, exanthemata, &c., preventing the application of the sapid substances to the nervous extremities. It is likewise occasioned, as Dr. Good observes, by the long-continued use of tobacco, whether by smoking or chewing, or of other acrid narcotics. In the Boston Medical and Surgical Journal for May, 1832, Dr. Robbins relates the case of a lady in whom the sense of taste on one side of the tongue was impaired by want of exercise. Owing to the presence of a very painful but not unsound tooth on the left side, the whole force of mastication was thrown upon the teeth of the right side. Liquids were from habit successfully passed through the mouth without coming in contact with the left side. After two years' continuance in this state, the painful tooth was extracted, and when the immediate effects of the operation of extraction had subsided, the lady observed that her sense of taste on the left side was considerably impaired in acuteness, and that she failed to perceive the true flavour of whatever was presented to its action. (Vide Lond. Med. Gazette, vol. x. p. 175.)

This affection, like the preceding, is to be cured by the removal of its exciting cause.

Anæsthesia (*diminution or absence of the sense of touch or of feeling*) affords much matter of interest to the pathological inquirer. We meet with it most commonly as a precursor of paralysis of motion, either in a minor degree, a condition of numbness, or in that of total insensibility; frequently it accompanies paralysis of motion, and rarely follows it.* It more frequently precedes paralysis of motion of the lower than of the upper limbs. Sometimes it is coexistent with paralysis of motion of the opposite side, as in a case by Cullen, of a gentleman who had loss of motion without loss of sense of one arm, and loss of sense with perfect motion of the other. (See, also, Ephem. Natur. Curios., cent. ii. obs. 196.)

Several cases of *complete* loss of feeling are now on record. In these cases the patients are insensible to injuries of the severest kind,—wounds with sharp instruments, burns, &c., and are constantly liable to accidents of this description, the skin having lost its protecting sensibility. Dr. Good quotes a case in which the anæsthesia had its seat in the right arm; in this case, the occurrence of a phlegmon on the affected arm excited no uneasiness, and some time after, when the patient accidentally fractured his arm, he received intimation of the accident merely from the crash which it produced. Dr. Yellowley gives the instance of a man who put his feet into boiling water, and was not aware of the height of the temperature till he perceived a vesication forming on one of his legs: in a similar case by Mr. Earle, the high temperature of some hot grains, into which the patient put his legs, was first evinced by the formation of large sloughs. We may add that in Dr. Yellowley's case above alluded to, a knife was introduced deep beneath the nail of the thumb without occasioning pain or uneasiness.

When anæsthesia occupies the external integument, in the immediate neighbourhood of any of the orifices at which that membrane becomes continuous with the mucous membranes, the latter are generally similarly affected to a greater or less extent. Thus in the cases of partial loss of feeling of the face, the conjunctiva of the eye, so acutely sensitive in its healthy condition, can bear pressure or friction, or even pricking with the point of a sharp instrument. The eyeball having thus lost its proper sensibility, the cornea is apt to become inflamed, opaque, ulcerated, and finally destruction of the eye ensues. Hence some physiologists have, with but little show of reason, argued that the nerve supplying sensibility to the conjunctiva is likewise the nerve of sight. The mucous membranes of the nose and mouth likewise participate in the insensibility in these cases. In the nose, the membrane is unaffected by pungent substances, as ammonia, &c., although the sense of smell is perfect: the introduction of a feather into the nostril does not produce any of the usual effects. In the mouth there is equal insensibility of the mucous membrane of the gums, lips, and tongue; the individual will bear even mustard in the mouth without being incommoded: he is insensible of the presence of food in that part of his mouth which is the seat of the disease; so much so that, in a patient in this condition, a portion of food has been known to remain in the mouth till it became putrid. In these cases the sense of taste is generally affected. Mr. Broughton (Med. and Phys. Journ. 1827) has related an interesting case, in which the anæsthesia succeeded to the recovery of paralysis of motion of the lower extremities; it occupied the skin of the nates, part of the loins, perineum, penis, and upper part of the thighs. In this case the insensibility extended to a great portion of the genito-urinary mucous membrane; the patient was unconscious of the presence of a catheter in the urethra; erections of the penis and emission of the semen took place likewise without the patient being sensible of them. But the most remarkable and interesting phenomenon connected with the case, was the kind of incontinence of urine which was present: "when the bladder was full, the urine overflowed on the slightest irregular movement, and ran out of the penis unconsciously to the patient." A similar case is detailed by Ollivier, in which incontinence of urine was coexistent with anæsthesia of the inner and anterior part of the thighs, and of the penis and scrotum. In these instances we presume that the insensibility of the inner membrane of the bladder is sufficient to account for the incontinence of urine, for how can those muscular fibres, which to a certain extent perform the office of a sphincter to the neck of the bladder, be stimulated to contrac-

* In a case reported by Dr. Colles, of Dublin, in the Appendix to Sir C. Bell's work, loss of feeling followed the cure of a partial paralysis of motion of the face.

tion, unless the mucous membrane of that viscus be sensible of the presence of the urine?

Anæsthesia is most frequently partial in its extent; we sometimes meet with persons who possess from birth a numbness of one or more fingers. Often the affection begins locally, but increases its extent gradually. Cases are recorded in which the anæsthesia was universal; in others it has been reported to occupy the whole surface, with the exception of a small portion, as in a case by Ollivier, where a patch on the right hip was the only sensible spot on the whole cutaneous surface; and in another quoted by Andral, in which the insensibility extended over the whole body, excepting a small round spot on one of the cheeks.

In partial anæsthesia existing on one side of the body, we generally find the insensibility limited with the utmost precision by the median line. These cases vary in extent from half the body to an extremity, part of an extremity, part of the face, &c. It has also been known to occur in numerous round spots, eight or ten in number, the surrounding skin being perfectly natural. (Andral's Lecture, Lancet, No. 497.) In the anæsthesia of the face we may here mention an invariable consequence; the patient complains that when he puts a glass or cup to his lips, it conveys to him the sensation of its margin being broken; and this circumstance is often the first to direct his attention to the complaint. When there is cutaneous anæsthesia of the extremities, we generally find that the power over the voluntary muscles is impaired; and this we might, *à priori*, expect to follow loss of sensation. A case by Dr. Yellowley confirms this supposition. The patient used to drop glasses, plates, &c. if her attention were directed from them; but so long as she kept her eyes on them, she held them in perfect safety. A precisely similar instance is adduced by Foville, (Dict. de Méd. et Chirurg. art. *Encephale*) in proof of the above assertion, as related to him by Sir A. Cooper. A third case we may mention from Dr. Ley. (Appendix to Bell on the Nerves, No. lxxxv.) There was defective sensibility on one side of the body; the patient could hold her child in the arm of that side so long as her attention was directed to it; but if surrounding objects withdrew her from the notice of the state of her arm, the flexors gradually relaxed, and the child was in hazard of falling. The fact is further illustrated by an incident of daily occurrence. When a person, from sitting in an awkward position, produces numbness in his lower extremity by the prolonged pressure on the sciatic nerve, he will find it almost impossible to stand on the benumbed leg alone, and that from the absence of the consciousness that the foot is applied to the ground.

Anæsthesia varies in its modes of access. In some cases the patient's attention is first attracted by the sensation of fine sand intervening between the skin and the object touched: in others there is a feeling compared to the creeping of insects over the skin, and thence named *formication*: both these after a little merge into total insensibility. Often the anæsthesia appears suddenly and without any premonitory symptom.

We cannot always assign a satisfactory cause for the condition which we have been describing. In general, however, it is referable to some change influencing the nerves which supply sensibility to the affected part or parts; in the trunk and extremities, the sensific filaments of the spinal nerves; in the face, the ganglionic portion of the fifth pair. This alteration may exist either in the nervous trunks themselves, or in the nervous centres, where the nerves are connected with them. Thus pressure, wound, or disease of a nerve, is constantly known to affect the sensibility of the parts supplied by it. Several instances are to be found in authors where anæsthesia followed concussion of the spinal marrow; injury or disease of the posterior bundles of the same could produce a like result. Loss of sensibility is often connected, too, with cerebral disease. Local injuries of various kinds will produce anæsthesia; it sometimes has commenced from a cicatrix, or succeeded the application of a blister. The sudden or continued exposure to cold is not an unfrequent cause: most of the cases related by Mr. Broughton were plainly attributable to this cause. Mr. Swan gives a case in which anæsthesia of the hand was produced by a violent pressure applied to the wrist; and Roche mentions one, in which the insensibility occupied the integument over the trajet of a ball which entered the body on the right side and ran round beneath the skin till it struck against one of the lumbar vertebræ.

Anæsthesia is likewise often connected with hysteria and hypochondriasis; sometimes it follows parturition, as in the case above quoted from Dr. Ley: it is also sometimes coexistent with mental derangement. We may add, that the condition of the circulation in a limb exerts a marked influence on its sensibility; suspended or retarded circulation removing or diminishing the sense of feeling, as is matter of daily observation.

The duration of anæsthesia is uncertain and variable: sometimes the sensibility will return when least expected; at other times it will resist all treatment. When it is the result of spinal concussion, it may be removed by the treatment generally adopted for that accident; and when produced by cold, the prognosis may also be favourable.

The treatment of this condition is founded more on experiment than on a correct pathology. It chiefly consists in local applications to the affected parts. Friction with various stimulants; baths of different descriptions, warm or cold; douches, blisters, or epispastics of other forms; electricity; may be enumerated as the chief curative agents. If an organic cause exist, either in one of the nervous centres, or in a trunk of a nerve, it is hardly necessary to observe that primary attention should be directed to ascertain how far that is removable.

We may here briefly allude to the remarkable epidemic which appeared in Paris in the summer and autumn of 1828. The most singular and constant symptom was a numbness, passing into a total insensibility of the skin and subcutaneous tissues on the hands and feet, and sometimes on other parts, of more or less extent. This was in general preceded by some symptoms of gastric or intestinal irritation, which continued often for many days or weeks. The insensibility, which was in general preceded by formication or prick

ing pains, was uniformly accompanied with an œdematous state of the affected limb; vesications, likewise, formed on it in different places: the skin was sometimes red, sometimes of a dark colour, and the epidermis detached in some places. The insensibility was so great in many cases, that no pain was experienced when pins were passed into the skin. In some cases there was subsultus tendinum; in others the muscles were paralysed; yet according to the report of M. Genest, (Archives Gen. de Méd. Oct. 1828,) from whom we have taken the above statement, the latter condition was not very frequent; but from the statement of Chomel to the Academy (sitting of 26th of August), it appears that considerable weakness of the feet and hands, with impossibility to move them, was a symptom very constant.

No organic lesion of the nervous system could be detected sufficient to account for this remarkable epidemic. From the examinations detailed by Genest, the intestinal mucous membrane seems to have been the seat of several ulcerations. To us there appears much analogy between this epidemic and that which is met with in tropical climates, the beriberi, or the more chronic barbiers.

Paralysis of Motion.—The second form of paralysis is that of motion, to which, from its being of so frequent occurrence and so serious in its effects, the term *paralysis* is more especially applied.

Like that of sensation, paralysis of motion is either complete or incomplete. It presents some variety in its mode of invasion: it may come on instantaneously, and without any premonitory symptom; the affected parts becoming suddenly flaccid and powerless, and thrown into a state of complete resolution: at other times the paralysis is preceded by inordinate muscular action, viz. by spasms attended with a considerable degree of pain, the muscles sometimes remaining in a state of rigidity after the invasion of the paralysis. Lastly, we find paralysis coming on slowly and gradually; the part being at first affected as to its sensibility, then becoming slightly torpid, and at length paralysed; the palsy then spreads on step by step, till it occupies a considerable extent. This is the form to which the term *creeping* palsy has been applied.

There are certain phenomena which constantly succeed to the attack of palsy. Wasting of a limb is an almost invariable consequence of paralysis. This would appear to arise more especially from the atrophy of the muscles, the result of prolonged inactivity; and, in part, from the deranged nutrition, in consequence of the removal of due nervous power. The muscles of a limb, when in a state of complete resolution for any long period, lose their colour, and are diminished in firmness as well as in dimensions; the colouring matter in some cases is completely absorbed, and a yellowish tissue, which however still retains the fibrous and fasciculated character, replaces the original muscle; a change which by some has been described as the conversion of muscle into fat.

The circulation in palsied limbs is said to be more languid than in healthy ones, and the pulsations of the arteries have been stated to be diminished in force and even in frequency. These statements, however, do not appear to have been founded on facts universally or even extensively observed, to say nothing of the sources of fallacy which lie in the way of a conclusive comparison of the relative force of arterial pulsations.

The nerves of palsied limbs do not in general present any obvious change. They have, however, been found increased in size, and of a yellowish colour; but it should be noticed that the enlargement might have arisen from the thickening of the neurilemma, or from the infiltration of a fluid, and not from any increase of the medullary substance. We may, moreover, state as the result of the experience of Andral, that he has never found the nerves of paralytic limbs either atrophied or hypertrophied. (Andral's Pathol. Anat. by Townsend, vol. ii. p. 797.) Sir C. Bell, however, is of opinion, as Dr. Cooke says, that the nerves of palsied limbs do lose some of their substance. When the nerves of a paralysed limb are diseased, it has been remarked that the wasting is more rapid and more manifest than in the ordinary cases, (see article Atrophy;) and judging from our own observation, we would infer that the atrophy is likewise more rapid when the paralysis is the result of spinal than when caused by cerebral disease. Thus how much more frequently do we observe wasting of the limbs of paraplegics than of those in whom the paralysis is in the form of hemiplegia! Yet we have seen limbs in the state of palsy, and that of some duration, in which there could not be detected any difference from sound limbs. We not unfrequently meet with palsied limbs in an œdematous state, more especially in old persons; we may also remark that the state of paralysis favours the formation of vesifications on the affected parts,—an occurrence more commonly noticed in paraplegia.

Much has been written respecting the temperature of paralytic limbs. Does it differ from that of healthy ones? or are they, from the want of nervous power or any other cause, less able to resist the influence of cold? Mr. Earle, by actual thermometric examination of a considerable number of paralysed limbs, found that their temperature was some degrees lower than that of the sound ones, and observes that, wherever nervous energy is impaired, the part loses the power of maintaining a healthy standard temperature, because the integrity of the nervous power is essential to the complete performance of the calorific function. (Med. Chir. Trans. vol. vii.) Observation, however, has frequently shown that paralytic limbs may be of a higher temperature than others. Dr. Abercrombie's views on this head place the question in so clear a point of view, that we shall transcribe his remarks: "In regard to the temperature of paralytic limbs, I think it is generally supposed that they are colder than the healthy limbs; but this does not appear to be the case. The truth seems to be that they have lost in some degree that remarkable power possessed by the living body, in a healthy state, of preserving a medium temperature, and that, *according to the temperature to which they have been exposed*, paralytic parts become hotter or colder than sound parts which have been exposed to the same tem-

perature. A case has been related to me by a friend in which a medical man, paying a visit to a paralytic patient, found the paralytic arm so intensely hot that it was painful to touch it. This, upon inquiry, was found to be owing to the application of very hot bran, which the patient had made to the arm by the advice of a neighbour, though he was himself insensible to the change of temperature." (Abercrombie on the Brain, &c. p. 288.)

The sensibility of paralysed limbs is generally more or less impaired; most frequently there is paralysis of sensation incomplete or complete, the latter, however, being very rare. Dr. Cooke states that he "never saw a case of palsy in which sensation was entirely lost; and an eminent physician of great experience asserts that a total loss of feeling in this disease is very rare." Sometimes the sensibility is exalted, and the patient can hardly endure the slightest touch upon the affected limb. Dr. Abercrombie refers to a case in which the sensibility of the arm was so increased, that the least breath of cold air excited convulsion. The sensibility may likewise be so altered that the patient will draw erroneous inferences from his sense of touch; thus, cold bodies will feel hot to him, and as in the case related by Dr. Falconer, (Mem. Med. Soc. Lond. vol. vii.) the feeling of heat will subside as the body in contact gradually acquires the temperature of the limb.

In general there is but little pain in palsied limbs; Drs. Cooke and Abercrombie, however, speak of patients who suffered extreme pain. We have observed pain accompanying incomplete palsy, and we should say that it is in such cases that pain is to be expected, there being in general a more or less spasmodic condition of the muscles.

The vital and natural functions, says Cooke, are generally but little affected in palsy; sometimes those of respiration and circulation are somewhat impeded, but this is generally towards the close of the patient's life. The bowels are usually more torpid, and less easily brought under the influence of purgative medicines, but the excretions are not diminished. When the paralysis extends to the sphincter, and to the muscular coat of the bladder, the involuntary discharges are apt to lead one to imagine that the excretions are increased in quantity.

Paralytics are in general irritable and peevish, and, if the palsy be of long duration, sometimes become quite imbecile. Dr. Cooke relates a case, however, in which the attack of paralysis produced a remarkable change in the temper of the patient;—"from being of an irascible and irritable disposition, he became perfectly placid, and remained so until his death about two years after." The powers of the mind too are not unfrequently affected, as well antecedently as subsequently to the attack of paralysis. The memory is most frequently affected in these cases: the power of recollecting names, whether of persons or things, as well as the memory of languages, is often lost; the habit of substituting one name for another, and a predilection for particular names, which the patient will apply to all persons and on all occasions, are also among the deranged mental phenomena attendant on these cases. In some instances, paralytics even invent names which are unintelligible to all except those who are in daily attendance on them. The writer remembers the case of an old domestic, rather famous for loquaciousness when in health, in whom some curious defects of verbal memory preceded for a considerable period the paralytic attack which ended her days. She entirely forgot the names of persons, and first lost the recollection of the names of those with whom she was most familiar; yet for some she invented names, which seemed to please her better than the real names of the individuals, as she almost invariably rejected the real names when they were mentioned to her. She had nearly the same defect as to names of things; she often pronounced the first syllable of the name of any thing she wished to ask for, but could get no farther; nor would she be put right. She at length grew irritable and suspicious of even those who ministered to her wants; she husbanded her few articles of property with the greatest care and closest watchfulness; and ultimately she became amaurotic, and the subject of extensive palsy. Such instances are, we believe, by no means rare. Dr. Bright relates one in some respects similar.

Causes of Paralysis.—It is to the effect of some alteration in the centres or ultimate ramifications of the cerebro-spinal system that observation has taught us to look for the true cause of most of the paralytic affections met with in practice. There are forms of palsy where no appreciable alteration can be detected in any part of the nervous system. Such are those in which the palsy arises from the impregnation with metallic particles — lead, mercury, and others, for which no satisfactory cause is assignable. Yet even in these cases we are scarcely warranted in denying the existence of organic lesions merely because they are not obvious to our senses. We would here observe that close and unbiassed observation is more called for to promote the elucidation of the class of affections we are now considering than of any other, and we may add that an accurate symptomatology is as essential to this important end as an exact and minute detection of the several morbid appearances of the cerebro-spinal system. It is mainly by a series of pathological facts, well arranged, that we can hope to unravel with certainty the many intricacies connected with that system in its healthy as well as its morbid state. To accumulated experimental and pathological investigations we owe in a great measure the advances made within latter years, and to such we look forward, and not without sanguine hope, for a still farther insight into a class of diseases at once dreadful to the afflicted and perplexing to the practitioner.

Paralysis is said to occur more frequently in men than in women, and generally in persons past the meridian of life; it is a common disorder of old age. Those of a sanguine and what has been called nervous diathesis are most liable to it.

Its exciting causes are such as dispose the brain, spinal marrow, or nerves to diseased action acute or chronic; accidents, and a variety of other causes, both moral and physical. (See Apoplexy and Inflammation of the Brain.) Exposure

to the action of particles of mercury, lead, and arsenic, produces a peculiar form of paralysis, the paralysis *venenata* of Cullen.

Paralysis is often co-existent with various nervous diseases — hysteria, epilepsy, mania, hypochondriasis. It also sometimes appears after parturition, and occasionally with phlegmasia dolens.

The duration of paralysis depends so much on its cause, the constitution of the patient, and various other circumstances, that no general statement can be made regarding it.

With respect to the extent of parts affected, we find that paralysis has, to use the words of Heberden, innumerable degrees, from the torpor and debility of a single joint of a finger to a complete apoplexy, in which sense and motion vanish from the body. It may, therefore, be divided into, 1. general paralysis, 2. partial paralysis.

I. General Paralysis. — When both sides of the body are paralysed, and when, in fact, the whole muscular system is deprived of the power of motion, so that the patient cannot move in any way by an effort of his own, the condition is that of general paralysis. If the four extremities be paralysed, the affection would likewise come under this head. It sometimes happens, that one or more of the senses are impaired in addition to the motive power; and not unfrequently the general sensibility of the body is diminished or destroyed.

It is remarkable to what an extent paralysis of motion as well as sensation will affect the body without destroying life. Some interesting cases are recorded in which the palsy was so general as completely to deprive the patient of all means of communication with the surrounding world. One of the most remarkable of these is that related by M. Defermon, in the Bulletin des Sciences Médicales for January 1828. It is defective, however, inasmuch as the examination of the body was not permitted. M. C. I., of a nervous habit, and having lived a dissipated life, was suddenly seized with amaurosis; which being suspected to have had a syphilitic origin, was treated accordingly, without success. Immediately afterwards there came on a remarkable exaltation of all the other senses, but especially of that of touch. His intellect being perfect, he was enabled to continue in the duties of his office in an important financial department. Some years afterwards his hearing became dull, and gradually advanced to total deafness; at length general paralysis of sense and motion, except in the tongue and muscles of deglutition and respiration, supervened; the whole body became insensible, and the limbs were successively paralysed, without the least trace of external lesion.

The patient was thus shut out from all means of communication with others; yet his speech and intellects were unimpaired. It was accidentally discovered that a small patch on the right cheek retained its sensibility; and by tracing letters on this sensible spot, his wife and children were enabled to maintain an intercourse of ideas with him! After some time, however, his strength began to fail, the paralysis extended to the sphincters, and he sank.

Another somewhat similar but more complete case is recorded in the Edinburgh Medical and Surgical Journal, for 1828, by Mr. Davies Gilbert, the late distinguished President of the Royal Society.

The young girl, the subject of it, had been born a little before her full time, and at birth was in a state of great weakness. She did not manifest in any way the instinct which usually directs other infants to seek their natural nourishment; she was consequently reared with much difficulty. One of her eyes was much smaller than the other, which seemed to be of the natural size. Some weeks after birth she was seized with violent convulsions, which lasted some time. She continued, however, to grow like other children, but a deficiency of sensation and motion became daily more obvious. She was destitute of the sense of sight and hearing, and a cataract was observed upon the eye which was of natural dimensions. The sense of taste appeared to be tolerably perfect, as she afforded some feeble sign of satisfaction when sweetmeats were given to her. As to voluntary motions they were totally defective, and she arrived at her seventeenth year without having ever raised her head, carried her hand to her mouth, or put a foot to the ground. She was quite dumb, and only occasionally uttered a feeble cry, which her attendants regarded as indicating a desire for food. Some time before death, her feebleness seemed to increase, and on the day in which she completed her seventeenth year she expired, so tranquilly that she was supposed to have fallen asleep. It is positively stated that this girl had shown some appearances of menstruation, as well as other signs of puberty.

On dissection, the brain appeared perfectly healthy, but on raising it from the cranium it was found that the dura mater lining the basis cranii was deficient, and its place occupied by a thin and semi-transparent membrane, very loose and singularly arranged; the tentorium cerebelli was likewise deficient, so that the posterior lobe of the brain rested immediately upon the upper surface of the cerebellum. All the nerves were perfectly regular.

General paralysis is most commonly the result of apoplexy, and is then accompanied with stertor, coma, and the other symptoms usually attendant on that disease. The continuance of circulation and respiration are the only remaining signs of life, the power of swallowing is impaired or lost, and the excretions pass involuntarily. This condition either gradually increases,—the paralysis extending to the muscles of respiration, and the vital powers becoming slowly exhausted,—or the coma subsides, consciousness is restored, and the patient is found paralysed in sensation and motion, to a greater or less extent; or the paralysis may totally disappear with returning consciousness.

Paralysis from apoplexy is easily detected, by the suddenness of its invasion and other concomitant circumstances. (See Apoplexy.) In surgical practice, this condition of general palsy is met with not unfrequently as a consequence of a severe concussion or compression of the brain.

We observe other cases of general paralysis, characterized by a development more or less slow. The tardy progress of these cases distinguishes them sufficiently from those which are the result of apoplexy. Most of them partake of the nature

of that described above as *creeping palsy;* there is some variety as to the part first affected: sometimes the eyelids fall, or a hand, or foot, or even a finger or toe become paralysed; sometimes, also, the tongue: at other times an impaired condition or complete loss of sensibility precedes the paralytic attack; sometimes loss of sight or hearing is the first indication; or a series of cerebral symptoms, for which it is difficult to assign an adequate cause: and this is often succeeded by impaired memory, and deranged mental powers, such as we have already alluded to. These cases generally result from disease, acute or chronic, affecting the brain, or its membranes, or from disease of the spinal cord. (See BRAIN, INFLAMMATION OF.)

Injuries of the spinal marrow in man and animals fully authorize the conclusion, that the higher in the spine the seat of injury is, the greater the extent of the consequent paralysis. Hence, then, we may reasonably expect that, in order to produce general paralysis, the spinal disease must be either of considerable extent, or situated at the upper part of the spinal marrow. This statement is confirmed by the cases (several of which are now on record) of rapid death following the separation of the atlas and axis, when a sudden compression is exerted upon the contained portion of the spinal marrow by the odontoid process.

The morbid conditions of the contents of the spinal canal which have been found coexistent with general paralysis, are pretty much the same as those of the brain and its membranes. They may be thus enumerated:—1. Inflammation of a considerable portion of the cord towards its upper part, the existence of which is generally indicated by ramollissement, suppuration, or abscess. 2. Extensive hardening of the substance of the cord, in which the membranes are more or less implicated. 3. Tubercles, or circumscribed tumours, developed in the spinal marrow. 4. Extensive serous effusion, probably an increase of the natural spinal fluid, as described by Magendie. 5. Thickening, or fungoid disease of the dura mater, and ossific growths, either in that membrane, or from the bony parietes of the vertebral canal.

In the present state of our knowledge of spinal diseases, it is not easy to assign any general symptoms which would point unequivocally to the spinal cord as the source of evil in certain cases of general paralysis. From all that has been collected on the subject, however, we think we are justified in asserting that there are certain phenomena which more frequently, or in a more marked manner, accompany paralysis resulting from spinal, than that which depends on cerebral disease. There is in these cases, generally, a more excited state of muscular action, evinced by spasms, twitchings, or even convulsions, and sometimes a permanent contraction. The sensibility of the surface, too, is often more deranged: thus, formication, tingling, or numbness, are very frequently found as the precursors of the form of palsy we are alluding to. We may further remark, that it is in cases of spinal disease that we sometimes see the line drawn with the greatest precision between the motive and sensorial powers; the latter being totally unimpaired, while the former is completely destroyed; a fact which seems clearly to direct us to the two distinct sources whence experimental physiology would derive these powers. Ollivier seems to think that diminution of temperature is more obvious in palsied limbs from spinal disease; and it would appear from the reports of cases by him and others, that they are more liable to œdema, vesication, sloughing, &c. In fine, the mode of access of paralysis dependent on spinal disease, is, for the most part, such as has been described as characteristic of the *creeping palsy* of authors.

We occasionally meet with cases of general palsy, well calculated to perplex the pathologist, presenting many indications of spinal disease; and yet, when we come to examine them after death, no lesion whatever is discernible, or at least a very slight one, obviously insufficient to account for the phenomena. We quote such a case from Dr. Abercrombie as a specimen, and it is further worthy of notice, as another instance of palsy almost universal. "A woman, æt. 20, a servant, sprained her back in lifting some heavy article of furniture. Some time after, she began to experience weakness of the legs, which gradually increased to perfect paraplegia. After some time the affection extended to the arms, and she then had not a vestige of motion of any of the parts below the head, except a very slight motion of some of the fingers; but the internal functions were all entire, and her speech was distinct, except that in speaking she was sometimes seized with spasmodic twitches of the lips and lower jaw. She lived in that state without any change in the symptoms, her general health continuing good, for about twenty years. In the morning she was taken out of bed and placed in a chair so contrived as to support her in a sitting posture. Her arms were supported on a cross board placed before her; and if by any accident one of them slipped from its support, she had no resort but to call the assistance of some other person to replace it. On one occasion the arm was allowed to hang for two hours, she having been left alone, and it became extensively œdematous. In the same manner, if her head fell forward upon the thorax, it remained in that position until raised by an attendant. Her mind was entire. She died of four days' illness with symptoms of typhous fever. I examined the body," adds Dr. A., "with the utmost care, along with Dr. Pitcairn, and *we could not discover any disease either in the brain or spinal cord.*" (*Abercrombie*, p. 417.)

Cases nearly similar as to the extent of palsy are recorded by Bretonneau and Ollivier, but in which a very slight morbid alteration was discovered. In one, the palsy commenced by loss of motion of the little finger, and rapidly spread to the extremities, the tongue, and partly to the muscles of deglutition. The patient, however, strange to say, retained the power of moving the thumb and two fingers of the right hand. In this case the only obvious morbid change in the nervous centres was, a rust-coloured spot three lines in extent upon the tuber annulare. (Revue Médicale, May 1826.) In Ollivier's case, a strong sense of pricking in the points of the fingers of the left hand, and toes of the left foot, was the first symptom. This was followed in half an hour by a similar sensation in the same parts on the right side. On the following day there was

general paralysis, but the sensibility was not impaired. Respiration and deglutition were considerably affected: the difficulty of respiration increased, and she died the third day. There was only a slight appearance of infiltration of blood in the cellular tissue on the outside of the dura mater of the cord, especially about the lower part.

Now and then cases of general paralysis, apparently dependent on the state of the spinal marrow, are observed to recover. Ollivier has recorded several examples of this kind. The palsy spreads from limb to trunk, commencing in the fingers and toes, and often preceded by tingling or formication, and more or less numbness of the cutaneous surface. The paralysis, although general in extent, is, however, rarely complete; the functions of the rectum and bladder are not at all or but slightly affected, and the intellectual powers are entire. In some cases the palsy is preceded by pains in the dorsal region of the spine, or a sense of fatigue, and lassitude and weakness of the spine. It has been observed to follow the stoppage of an habitual evacuation, abuse of sexual intercourse, and the suppression of the lochia in women after parturition. Such cases are supposed by Ollivier, and with much reason, to be occasioned by a temporary congestion of the vascular system of the spine, especially the venous system, so remarkable for its numerous and intricate anastomoses.* He conceives that, although the anastomoses are large and numerous, yet the circulation is often deranged and retarded; for, first, these veins are destitute of valves; secondly, he has found in old persons fibrinous clots filling all the venous ramifications of the spinal marrow, as well as those which accompany its nerves; and, lastly, he considers that respiration exerts a direct influence on this portion of the circulating system, and causes obstacles in it during efforts of various kinds, or strong emotions, or those affections which in a greater or less degree excite the respiratory act. (*Ollivier*, De la Moëlle Epinière, vol. ii.) As a venous congestion, such as we have been alluding to, is not likely to be a permanent morbid appearance, that is to say, might be dissipated under the influence of various causes, either immediately prior or subsequent to dissolution, it is not unreasonable to suppose that some of those cases in which no morbid change was discoverable, may have been attributable to a similar cause.

The general paralysis of lunatics, as described by Esquirol and Calmeil, has been already fully noticed in the articles Brain, Inflammation of the, and Insanity. We may here observe, however, that one of its earliest symptoms, viz. defective articulation, would alone serve to distinguish it from palsy dependent on spinal disease.

It is hardly necessary to advert to the propriety of observing great caution in forming a prognosis of any or all of the forms of general palsy now described. The difficulty of arriving at a certain diagnosis of the proximate cause must necessarily involve the practitioner in considerable doubt.

II. Partial Paralysis.—Under this head are included those varieties of paralysis in which only a part of the body is engaged; it admits of a threefold division — 1. local paralysis; 2. hemiplegia; 3. paraplegia.

1. **Local Paralysis.**—This division comprises all those palsies which have their seat in parts of small extent. Local palsies are most frequently met with as precursors of a more extended condition; yet we sometimes find them localized as well in cause as in extent. In the former case they should be regarded with great suspicion, and should excite a vigilance on the part of the practitioner to counteract, as far as possible, the threatened danger; hence the importance of distinguishing accurately between local palsies under these different circumstances.

We shall notice local paralysis under the following heads: 1. paralysis of the eyelids; 2. paralysis of the face; 3. paralysis of a limb or part of a limb; 4. paralysis of particular sets of muscles, or of single muscles.

Paralysis of the Eyelids. — Two forms of palsy are found to affect the eyelids, which, as engaging antagonist muscles, are totally opposite in their effects. In the one, the eye remains totally or partially closed (*ptosis, blepharoptosis*); in the other, the eyelids are permanently open, the patient having lost in a greater or less degree the power of closing them (*Lagophthalmia*).

Ptosis has been so named from its chief and most conspicuous phenomenon, viz. the drooping or fall of the upper eyelid; it occasionally comes under the care of the surgeon as arising from a relaxation and extension of the common integuments of the lid and consequent folds of the skin, by which the energy of the *levator palpebræ superioris* muscle is somewhat but not very considerably diminished. (Weller's Manual of Diseases of the Eye, by Monteath, vol. ii. p. 97.) But that form which we are about to notice, is dependent essentially on palsy of the muscle above-named, owing to some affection of the nerve which supplies it. It has been named *blepharoplegia* by the Germans, the patient being unable by any voluntary effort to raise the upper lid, although the power of closing the lids remains entire. It is therefore the object of the practitioner to ascertain in the first place whether this condition of the eyelid be merely produced by the mechanical cause above alluded to, and, secondly, if it be connected with a deranged state of any of the muscles of the eyelid. To decide the first question, we would adopt the proposal of Scarpa. "If," he observes, "the atony or complete paralysis of the elevator muscle of the eyelid have had any share in producing the relaxation of it, it may be known by making a transverse fold of the integuments with the fingers or forceps near the superior arch of the orbit. For if this muscle has not lost its power of contraction, when it is relieved, as it were, from the superincumbent weight of the integuments, the patient is able to raise the eyelid and open his eye sufficiently; if otherwise, the eye remains half closed." (*Scarpa*, by Briggs, p. 127.) Such a proceeding, it is obvious, must at once determine the state of the *levator palpebræ* muscle; but it should be remembered that a spasmodic state of the *orbicularis palpebrarum* muscle may likewise produce the appearance of fallen lid. The want of perma-

* If the reader can have access to the beautiful and accurate plates of Breschet, "Du Système Veineux," he may from them form an adequate conception of the extent and intricacy of the veins of the spine.

nence of this affection, the occasional power of raising the lid, and the degree of resistance which is always made by the spasmodic state of the orbicular muscle to any attempt to open the lids, will in general be found sufficient to indicate the precise nature of the affection.

Secondly, the practitioner should direct his attention to the motions of the eye-ball. It rarely happens that the fallen lid is a solitary affection; in general, and when it does not depend on either of the causes above named, we find a paralysis of most of the muscles of the eye complicated with it. The patient, it will be observed, has no control over the voluntary motions of the eye-ball; when told to look to the ground, he is unable so to do, and the same inability is manifested when directed to look upwards or inwards. If the eyelids be forcibly opened and held apart, and the patient be desired to endeavour to close them, the eye-ball is seen to turn upwards when he makes the effort. Sometimes the power of looking outwards is retained, and in some instances a strabismus in that direction is present.

A moment's reflection will show that symptoms such as we have now detailed can only be produced by a palsied state of the third nerve. The muscles supplied by the nerve are paralysed, and the eye-ball exhibits motion in only two directions. One of these is abduction, performed by the external rectus which is supplied by the sixth nerve; the other is to be regarded as an involuntary action, instinctively coexistent with the effort to close the eyelids: it is that by which the eye is turned upwards, and, according to Sir C. Bell, is caused by the combined action of the obliqui, (See Appendix to Bell on the Nerves, p. xxxix. et seq.) although in such a case as we are now considering, it is difficult to conceive the inferior oblique muscle can be exempt from that paralysis into which all the other muscles supplied by the third nerve had fallen.

Ptosis, attended with such an imperfection of the motions of the eye-ball, is to be regarded in general as a formidable affection; it is very frequently indicative of cerebral disease, and therefore is often witnessed as a precursor or accompaniment to hemiplegia. Sometimes it is merely the result of local compression of the nerve by a tumour within the orbit. There are occasionally present symptoms indicating more extensive disease, the sensibility of the eye being destroyed, as well as of the integuments supplied by the ophthalmic portion of the fifth nerves, or even of the whole side of the face. Such a case was that related by Mr. Shaw in the twelfth volume of the Medico-Chirurgical Transactions.

If the affection which we have thus briefly noticed be dependent on cerebral disease, the treatment must be directed accordingly; it is obvious that when it is caused by a tumour in the orbit, it is almost completely beyond the control of medicine. Cases may occur in which the propriety of a surgical operation may become a question: we shall only remark on the necessity of observing due caution, lest by converting a closed state of the eyelids into a permanently open one, we thereby endanger the safety of the eye-ball, from its unavoidable exposure to irritating particles.

The second form of palsy of the eyelid is that in which the patient is unable to wink or close the lids. It has been denominated *lagophthalmia, vue de lièvre, oculus leporinus,* from the vulgar notion that the hare sleeps with its eyes open. In these cases the eye remains permanently open, even during sleep, the orbicularis palpebrarum muscle being paralysed. The eye-ball projects to an unusual degree from the socket, owing to the absence of the accustomed resistance from the lids, and if the patient be directed to attempt to close the lids, the eye-ball is instinctively turned up with the effort so as nearly to conceal the cornea; nor is he conscious of that action. As winking can only be performed by drawing down the lid with the hand, free access is allowed for particles of dust, &c. to the surface of the eye, which, being likewise constantly exposed to the air, is necessarily subjected to much irritation and consequent inflammation.

This form of local palsy is chiefly worthy of attention from the contrast afforded by it to that last described; it is unquestionably dependent on disease of the portio dura nerve, and therefore is for the most part only a symptom of a paralytic affection which comes under our next head.

Paralysis of the Face.—The muscles of the face receive their nervous supply from the fifth, as well as from the portio dura of the seventh, pair of nerves. Of these, as is now pretty generally admitted, in conformity with Sir C. Bell's views, the former is a compound nerve, conveying sensibility as well as the power of voluntary motion; the latter directs the actions of the muscles in relation to the respiratory act. We have already alluded to the loss of sensibility of the face; it remains to notice these two distinct forms of partial palsy of the face, according as the motive portion of the fifth or the portio dura is the nerve affected.

Reasoning *à priori*, it is quite obvious that palsy of the fifth must produce a set of phenomena very distinct from those resulting from palsy of the portio dura. All voluntary power not only over the features, but also over the motions of the jaw, must be lost on the side affected; whilst, if the latter nerve be in a state of integrity, those motions of the facial muscles which are in accordance with the act of respiration are unimpaired. Mastication is impeded not only by the imperfection of the grinding motions of the jaw, but also from the loss of power in those muscles which place the morsel under the operation of the teeth; "in chewing, the action is only on the *sound* side of the head; the masseter and temporal muscles of the *affected* side do not rise or bulge out as in their natural actions, while there remains a perfect command over the features through the operation of the portio dura." (Bell on the Nerves, p. 106, 4to edition.) The distortion of the countenance is not very great; the jaw hangs on the affected side, and the angle of the mouth is depressed, that of the other side appearing to be slightly raised; the distortion is moreover either removed or greatly diminished when the patient laughs or smiles, an effect which all excited states of the act of respiration tend to produce. The condition of the face now described is that most commonly seen in hemiplegia; it is rarely met with unconnected with a more extensive palsy,

and when it does occur, the sensibility of the face and eye-ball, nostrils and tongue, is very generally impaired or destroyed. The disease of the fifth nerve may be seated either within the cranium immediately in connection with its ganglion, or there may be cerebral disease.

In those cases where the portio dura is the seat of disease, [*Bell's palsy,*] there is no evidence of the existence of palsy till those actions are called for, to the performance of which the palsied muscles ought to contribute. So long as the patient remains quiet, without speaking or smiling, nothing remarkable is observable in the countenance; but when any of the actions of excited respiration, laughing, sneezing, coughing, crying, &c. are produced by the sound muscles, the marked deformity of the countenance becomes apparent. The mouth is drawn to the sound side; and it may be observed in general that the disorder of the features is directly as the intensity of the respiratory act: thus laughing produces greater deformity than smiling. The affected cheek remains motionless, while, to use the expressive words of Mr. Shaw, the face on the other side "seems convulsed with laughter." The patient cannot snuff up with the nostril of the paralysed side; blowing or whistling is imperfectly performed, or failed in altogether. On further examination it will be found that voluntary motion still exists in the muscles of the face and jaw, varying, however, in degree in each, according as the voluntary action of the muscle is more or less connected with respiration. Thus mastication is perfect; here the buccinator performs its office fully as a muscle of mastication, and in one striking case related by Mr. Shaw the child even preferred chewing her food with the affected side. The voluntary action of the muscles influencing the motions of the mouth are not so distinct as those of the muscles of the jaws. Although, when an attempt is made to whistle, it proves completely ineffectual, yet the patient can "purse up" the mouth so as to hold a whistle or a pencil by the action of the orbicularis oris muscle. A slight power remains of elevating the angle of the mouth, and an analogous power can be exerted over the muscles of the forehead.

It is in the cases to which we are now alluding that we meet with that condition of the eyelids termed *lagophthalmia*, and it generally forms one of the most painful and distressing features of the case, in consequence of the constant irritation to which the eye is exposed. Articulation is sometimes affected in this form of local palsy; the patient learns from experience that by supporting the paralysed cheek with his hand the defect can be in some degree remedied. It is clearly important to distinguish between defective articulation arising from this cause, and that from palsy of the muscles, of the tongue, or larynx. The wasting of the paralysed muscles is equally conspicuous in this as in other forms of palsy, and in cases of old standing gives such a peculiar appearance to the countenance, as could hardly fail to direct an experienced observer to the true nature of the complaint. Mr. Shaw, in relating the particulars of a case, writes thus: "There is a remarkable wasting of all those muscles of the face which are subservient to respiration and expression. His cheek is so thin that when he speaks it flaps about as if it were only skin, and the corrugator supercilii and occipito-frontalis, which are principally muscles of expression, are so wasted that we might at first sight suppose they had been removed by operation, and that now the bones were only covered by skin." (Med.-Chir. Trans. vol. xii.)

Several opportunities have now occurred of ascertaining the cause of the palsied state of the portio dura. In many instances it has been suddenly produced by the influence of cold; the affection, as resulting from that cause, was long known under the name of *blight*. An inflamed state of the parotid gland, a tumour in the neighbourhood of the stylo-mastoid foramen, or an ulcer over the course of the nerve, have been found severally to cut off the nervous supply. Wounds of the portio dura, whether from accident or the surgeon's knife; disease of the petrous bone, engaging the aqueduct of Fallopius; inflammation of the internal ear; or a tumour compressing the nerve at its entrance into the internal auditory foramen, may likewise be reckoned among the causes. In fine, this form of palsy may have its origin in disease of the brain.

The symptoms above detailed are such as arise from a palsied state of either the fifth or seventh nerve, the other being perfectly free from any disease. Symptoms, however, so exclusively denoting an affection of a particular nerve of the face, are not frequently to be met with, and then only at a short period after the invasion of the palsy; for if the disease be of any continuance, the palsy is apt to spread, as it were, to the unaffected nerves. This is more especially the case when the portio dura is primarily affected, the slight degree of voluntary power over the muscles of expression gradually disappearing, but not from those of mastication. When the fifth nerve is the primary seat of disease, the branches of the portio dura retain their integrity for a much longer period, and in some instances do not exhibit any mark of disease; but in many cases, where the palsy has been of long duration, the extent of the disorder of the countenance can hardly be accounted for, except on the supposition that the disease has extended to the filaments of the portio dura. We think that a careful observation of the countenances of individuals who have been hemiplegic for some time, will sufficiently confirm this statement.

It is rare to meet with palsy of both nerves at the same time.* When such is the case, there must obviously be a modification in the symptoms dependent on the complete resolution of the muscles of mastication as well as of expression. The characteristics of the countenance of the hemiplegic will be conjoined with the strangely-disordered expression resulting from the diseased portio dura.

In the treatment of local palsies of the face, especial attention should be directed to ascertain the state of the brain. If there be reason to suspect that the origin of the complaint is there, of course the treatment will be directed to that quar-

* See a case by Dr. Abercrombie, in which the fifth nerve was paralysed on one side of the face, and the portio dura on the other, occasioned by a tubercle in the brain. On the Brain, p. 178.

ter. If otitis, or the pressure of a tumour externally, be the cause, then the proper remedies to subdue the inflammation in the one case, and to promote the absorption of the tumour in the other, must be had recourse to. External stimulants, blistering, directing the steam of boiling water to the face, local bleeding, will be found useful, but especially in the cases which have been caused by cold. The application of strychnine to a blistered surface has proved successful in some cases; the eighth, fourth, or half a grain may be applied on the dressings. We may here observe that the acetous preparation of cantharides, rubbed on to the part with a camel-hair pencil, will be found a very convenient and cleanly mode of producing vesication on the face in these cases. Electro-puncture has been practised with great success by Pichonniere in several cases of this kind; the needles having been sunk in the vicinity of the branches of the diseased nerve. (Pichonniere sur la Paralysie particlle de la Face: Paris, 1830.)

Paralysis of a limb or part of a limb.—In children, palsy of a single limb (generally an upper limb) is not uncommon; sometimes dependent on a deranged and loaded state of the bowels, sometimes on disease of the brain, and occasionally from congenital deficiencies in that organ: in such cases, if the child grow up, we see, to use the expressions of Sir C. Bell, the limb of a child as it were unnaturally joined to the body of an adult.*

A peculiar form of palsy of the upper extremity is described by Dr. Healy, in the third volume of the Dublin Hospital Reports. "The affection alluded to attacks persons of all ages, males and females being equally liable to it. Prior to the attack, the patient generally enjoyed good health; consequently he is not a little surprised, on awaking from a long and sound sleep, to discover total loss of power of one hand; and, what is remarkable, he generally describes the loss of power as extending to the middle of the fore-arm: in some few cases it extends to the elbow, and is accompanied with a great sense of numbness. The fingers are so completely paralysed that the patient is deprived of their use: great dejection of spirits attends the complaint." No cause could in general be assigned for these symptoms, unless the pressure upon the nerves occasioned by lying with the head resting on the arm; an opinion confirmed by the fact that in many the palsy succeeded to sleeping in a chair in that position. Dr. Healy further remarks, that "this affection has invariably yielded to electricity."

Dr. Darwall has described a species of paralysis affecting the upper extremity, most of the individuals attacked having been in the habit of lifting heavy weights. In some of the cases the palsy at first occupied the muscles connecting the humerus to the scapula, especially the deltoid, which was wasted; there was, therefore, inability to raise the arm, but the power of flexing the fore-arm remained. After some little time, total paralysis of the upper extremities gradually supervened. In one case of this kind, the patient continued for eight years without any use whatever of his upper extremities. In some of the cases the paralysis did not descend below the muscles of the shoulder. Considerable pain in the deltoid muscle generally preceded the paralysis, and one or two of the cases yielded readily to treatment in that stage. Dr. Darwall considers this affection as "one primarily engaging the nerves supplying the elevating muscles; and that they may have been injured by the straining necessary in raising or carrying heavy weights." (Lond. Med. Gazette, vol. vii. p. 201.)

A case in some degree analogous to those last alluded to is recorded by Dr. Abercrombie; it is that of a young lad aged 14, who had nearly lost the muscular power of the upper part of both his arms, accompanied by a most remarkable diminution of substance of the principal muscles. The deltoid and biceps were reduced to the appearance of mere membranes, and the muscles of the scapula were found nearly in the same state; the affection came on gradually, without any sign of spinal or cerebral disorder.

Local palsy seated in either extremity, or part of an extremity, is mostly, as all other forms of local palsy, found as the first step or stage to a more extended affection. In such cases there is frequently some indication to direct the practitioner to the true source of the complaint. It is not uncommon to meet with instances where palsy affects only a few of the muscles of an extremity. The muscles affected are, as Sir C. Bell† observes, generally those which are naturally combined in action; although those muscles be in different parts of the extremity, and are supplied by different nerves as they are by different arteries; of which an obvious example may be taken from the case of paralysis of the short muscles of the ball of the thumb, in which the palsy also extends to those muscles of the thumb which lie on the fore-arm. Sometimes all the extensor muscles will lose their power, while the flexors preserve it. This seems to be the case in a patient alluded to by Dr. Bright. She had no power of extending her hands; they were precisely in the condition of the "drop hand" from the paralysis caused by lead. She could carry her child between her fore-arms and arms. Sir C. Bell has found the action necessary for writing gone, or the motions so irregular as to make the letters be written zigzag, whilst the power of strongly moving the arm or fencing remained.

It may be asked, what is the condition of the nerves in these cases of local palsy? Some instances have presented symptoms in the commencement indicating an inflammatory state of the nerve or its neurilemma, which has been further confirmed by the success which has followed local depletion and other antiphlogistic remedies in such cases. It is not rare to see a palsied and atrophied state of the lower extremity succeed to inflammation of the sciatic nerve. In a case by Shaw, palsy of the extensors of the fingers and thumb succeeded to tight bandaging after a dislocation of the shoulder, and was evidently caused by inflammation of the musculo-

*See a case by Rostan, "Sur le Ramollissement du Cerveau," obs 1. p. 256. Also cases by Cazauvieilh in his memoir "sur l'Agénésie cérébrale," Archives Gén. de Médecine, 1827.

†On the Nervous System; Appendix, p. clx. The reader will find in the appendix to this work a valuable and highly-interesting collection of facts connected with all the varieties of local palsy.

spiral nerve. (Med.-Chir. Trans. vol. xii. p. 132.) Dr. Bright has given a case in which complete paralysis of the fore-arm resulted from the pressure on the nerves produced by a badly united fracture. Paralysis from pressure on a nerve in various ways is common. Dr. Abercrombie mentions a case of paralysis of the fore-arms and hands of both sides, induced by pressure in consequence of leaning for a long time upon a bar of wood, while the person was stooping forward in his anxiety to witness some public exhibition.

There are cases of local palsy affecting the extremities, or parts of them, in which the state of the circulation in the limb seems a more probable cause of the attack than any primary disorder of the nerves: such are those cases detailed by Dr. Storer, Dr. Abercrombie, and others. The sudden accession of considerable pain in the part is the first symptom; this is succeeded, after a variable interval, by paralysis. The cessation of pulsation in the principal arteries of the limb, with the coldness and numbness which attend the palsy, seem strongly to point to the arterial system as primarily diseased. In Dr. Abercrombie's case, post-mortem examination proved that the arterial system was extensively ossified; and in many places the arteries were obstructed by firm coagula. Drs. Graves and Stokes have also given a case of paralysis of one of the lower extremities from marked disease of the common iliac, femoral, and profunda arteries of the same side, those vessels being completely plugged up by a dark clot, which likewise extended into many of their ramifications. (Dublin Hospital Reports, vol. v. p. 1.) There are paralytic states of the extremities connected with rheumatism and gout, for an account of which we refer to the articles on those diseases.

Paralysis of sets of muscles or single muscles.—The muscles concerned in the act of deglutition are sometimes affected with paralysis, but in general towards the close of an old paralytic affection of great extent. Some few cases, however, are recorded in which these muscles were alone paralysed. A well-known case of this kind is that described by Mr. Hunter. (Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, vol. i.) The patient had laboured under a train of nervous symptoms for some time; one morning he awoke with a sense of choking, a numbness of the right side, together with a paralysis of the muscles of deglutition, which deprived him of the power of swallowing. The palsy did not extend; and this patient owed his cure to the judicious employment of an elastic tube introduced into the œsophagus, by which food and medicines were administered, thus obviating the effects of the palsy. Hysterical palsy sometimes assumes this form, giving rise to dysphagia. The muscles of the larynx may be likewise palsied, giving rise to a species of aphonia: this likewise frequently takes place in hysterical cases. Palsy of the tongue, as a solitary affection, is of very rare occurrence. Sometimes one-half of it is paralysed in consequence of pressure on the ninth nerve upon that side; as in a case related by Dupuytren in his Leçons Oracles, in which a hydatid compressed this nerve, producing paralysis and atrophy of the same side of the tongue.

Single muscles are frequently the seat of paralysis, in general occasioned by pressure upon the nerve which supplies the muscle. The palsy of the deltoid from pressure on the circumflex nerve by the dislocated head of the humerus, is a case familiar to every surgeon. Palsy of the sterno-mastoid muscle may give rise to all the characters of wry neck. Paralysis of the serratus magnus anticus muscle from pressure on or injury of the posterior thoracic nerve (external respiratory of Bell) gives rise to a remarkable set of phenomena, with which, as liable to lead him to mistake the complaint for something more serious, the practitioner ought to be acquainted. Two cases of this affection are on record; one by Gendrin, the other by Velpeau. In Gendrin's case, there was a marked deformity produced by a tumour seated at the superior dorsal region of one side, and which was evidently formed by the posterior edge of the scapula pushed firmly backwards; it appeared without any assignable cause in the course of a few days. The power of drawing the scapula forwards, and elevating the prominence of the shoulder, was lost; and when both rhomboid muscles were made to act fully, and to approximate the scapulæ posteriorly, the tumour disappeared completely. This case had been mistaken by two medical men for distorted spine. The patient recovered after a few weeks, under the successive application of blisters. (See Gendrin's French translation of Dr. Abercrombie's work on the Brain, p. 646.) In Velpeau's case the palsy was caused by violence inflicted on the nerve in its passage along the inner wall of the axilla. (*Velpeau*, Anat. Chirurg. vol. i. p. 303.)

Many forms of strabismus are occasioned by a palsy of one or more of the muscles of the eyeball; the sound muscles thus obtaining a predominance of action.

The internal muscles, those of organic life, are sometimes palsied. The circular coat of the intestines is no doubt frequently the seat of paralysis; an opinion which would seem to be confirmed by the frequent occurrence of paralysis of the sphincter ani.

Paralysis of the bladder, from prolonged overdistension, frequently comes under the surgeon's care. In such cases, as well as in that connected with paraplegia, there is *retention* of urine. *Incontinence* of urine is in some cases, in old persons especially, to be regarded as dependent on a paralysed condition of the fibres which act as a sphincter to the neck of the bladder. (*Boyer*, Maladies Chirurgicales, vol. ix. p. 274.)

Treatment.—The treatment of the last two classes of local palsy should be conducted on similar principles to those laid down in speaking of paralysis of the face. Of course the palsied states of the bladder will require a distinct plan of treatment, chiefly surgical. Paralytic limbs may be benefited by local treatment, to which we shall refer more at large in another part of this article.

2. **Hemiplegia,** (ἥμισυ, *dimidium*, and πλῆσσω, *percutio*,) *semisideratio.* The term is applied to denote paralysis existing only on one side of the body, and affecting not less than the upper and lower extremities. Some have employed it in alluding to paralysis occupying the upper and lower extremities of opposite sides; but that form of

palsy may, with less risk of confusion, be denominated *crossed or transverse paralysis* (paralysie croisée).

Hemiplegia is by far the most frequent species of palsy met with in practice; and it has been stated, upon the authority of Sir Gilbert Blane's comparative observations, that it occurs more frequently on the left than on the right side; the proportion being as three to two. (See also Dict. des Sc. Méd. art. *Paralysie.*) In general the paralysis affects the side of the face as well as the extremities; the angle of the mouth is drawn to the sound side, and more or less upwards; the tongue is frequently half paralysed, as is rendered evident on its protrusion, when it presents a curve, the convexity of which is towards the affected side: sometimes it is only sluggish as it were, the patient not having the full power of protrusion. The muscles of deglutition are frequently more or less engaged. The mode of progression of a patient labouring under hemiplegia is remarkable. He is said to "drag the leg," the paralysed lower extremity being moved along, or perhaps propelled, by the inclination of the trunk to the sound side; the foot is generally pointed outwards, and when the limb is raised it falls as it were by its proper gravity, presenting that remarkable pointing of the foot which cannot fail to have attracted the attention of any who may have observed a hemiplegic patient walking. The arm of the affected side generally is adducted to the trunk, and the fore-arm appears slightly flexed upon the arm, the wrist and fingers being likewise in a slight state of flexion.

Considerable variation is observable in the manner in which hemiplegia appears. The symptoms which precede or accompany its invasion claim much attention from the practitioner, as being his chief guides in the formation of a correct prognosis, as well as in the application of suitable treatment.

1. Hemiplegia is the most common form which paralysis assumes from effusion of blood within the cranium. When the coma of the apoplectic seizure is removed, and consciousness is restored, the patient is generally observed to be hemiplegic.

2. Hemiplegia sometimes appears suddenly without previous indication, and with or without stupor: in such case it is most frequently a precursor of apoplexy. (*Abercrombie*, p. 14.)

3. A third variety is that in which symptoms more or less painful in their character precede the paralytic attack: pain in the head, with fever of variable duration and intensity; more or less disorder of the intellectual powers; spasmodic twitchings of the muscles; muscular stiffness; convulsions, ending in hemiplegia, with considerable pain in the paralysed limbs.

4. Another form occurs chiefly in persons past the meridian of life. The patient is observed to be morose, heavy, and drowsy; his digestion is disordered; memory and intellect are impaired; there is a loss of one or more senses, usually sight or hearing; then sudden loss of speech, difficulty of protruding the tongue, followed by paralysis of half of it; distortion of the face; complete hemiplegia.

5. A train of symptoms of an anomalous, and to the physician, a perplexing character, sometimes precede the hemiplegia: viz. headach, nervous excitability, deranged functions, with a number of uneasy sensations referable to various causes. The patient continues to complain; nor is the obscurity of his condition removed till paralysis begins to develop itself either by suddenly attacking one half of the body, or by creeping on from some remote part. It is with such cases as these that we occasionally observe symptoms resembling chorea, or fits of an epileptic character. The writer has lately seen a child in whom there is an incomplete hemiplegia, the lower extremity being completely paralysed, the upper partially so: there is also a convulsive action of the flexor muscles in the fore-arm, and a convulsive protrusion of the tongue, taking place almost every two minutes; there is slight ptosis of the eyelid, but the features are regular. The case of the celebrated M. de Saussura is one somewhat in point. (See Med.-Chir. Trans. vol. vii.)

6. Hemiplegia is occasionally met with at some period after the receipt of an injury of the head. We remember such a case in the person of a gentleman about forty years of age, who about two years previously had been severely wounded in the head by highwaymen. The hemiplegia, which came on gradually, and was on the side opposite to that on which the injury had been inflicted, was complete, and resisted every kind of treatment. The case proved fatal, but the body was not examined after death.

The morbid state of the brain, with which hemiplegia in the above-mentioned varieties is connected, have already been sufficiently dwelt upon in the article Brain, Inflammation of the. In fact, there is no diseased condition of either the brain or its membranes with which this form of palsy has not been found coexistent. With a few exceptions, not altogether to be relied upon,* the disease has been found on that side of the brain opposite to the seat of the paralysis. That this should be the case, anatomy would lead us to expect; the interlacement or decussation of the fibres of the anterior columns of the spinal marrow (*corpora pyramidalia*) at their summits being now generally admitted, and easily demonstrated. According to the views of Foville and others, we should likewise expect to find the optic thalami and corpora striata, or some of the fibrous radiations which pass through these bodies, the seat of disease in hemiplegia. And in point of fact we must admit, that in the generality of cases of this description, those bodies, or some portion of the cerebral hemisphere, present a morbid alteration of structure variable in extent as well as in degree. Cases, however, it must likewise be admitted, do occur, in which only one of the bodies above-mentioned is the seat of disease, or in which no appreciable alteration can be detected in the hemisphere. Such occurrences can hardly be deemed as decidedly to militate against the theory of Foville, &c. inasmuch as our ignorance of the mechanism of cerebral action, whether healthy or

* See the cases of Bayle, Revue Médicale, 1825; one by Bright, (Reports on Diseases of the Brain,) which the author himself admits to be a "doubtful exception;" and Morgagni, lib. 1. epist. ii. § 16. The most complete exception with which we are acquainted is one mentioned by Cazauvieilh, Archives Gén. de Médecine, May 1827, p. 15-16.

morbid, is alone sufficient to render them anomalous to us. They should, however, increase our caution in receiving speculations upon the uses ascribed to the different portions of the brain, and should excite us to increased accuracy of detail and minuteness of inquiry upon these points of pathological anatomy.

Hemiplegia may be induced by diseases of the upper part of the spinal marrow, the morbid alteration being on the same side with the paralysis. Such cases are rare, however; for it is seldom that disease would be exactly limited to a lateral half of the marrow. In general, when they do occur, the hemiplegia is only a precursor of the general paralysis above described. Dr. Bright, (Op. Cit.) Ollivier, and Velpeau (Archives Gén. de Méd. June 1825,) give cases of this description; and in the Edinburgh Medical and Surgical Journal for April 1825, a case is related where hemiplegia resulted from concussion of the spine, accompanied with complete anæsthesia of the other side of the body. The paralysis of motion did not extend. (See also a case by Portal, Anat. Méd. tom. iv. p. 116.)

Cazauvicilh has published two interesting memoirs on *congenital* paralysis, by which he would signify that which appears at birth, or a short time after it. To the cerebral alteration on which the paralysis depends he has given the name "*agénésie cérébrale*," denoting a defect of development or of growth in the brain or any of its parts. In the majority of the cases detailed in these memoirs, the paralysis was in the form of hemiplegia, the limbs were greatly wasted, stunted in growth, and with many in a state of permanent flexion. The upper extremities were generally more altered than the lower; in many cases they were bent and contracted, the elbow, wrist, and fingers being flexed. Among the muscles of the lower limbs, those of the calf of the leg chiefly presented the phenomenon of contraction, and thereby kept the foot permanently extended. The paralysis was complete in only a small number of cases. The organic defects were as follows: a depression on one side of the cranium indicated a corresponding want of development of the subjacent cerebral hemisphere, — a deficiency further proved by the flattened, non-developed appearance of its convolutions, the difference of size from the hemisphere of the other side, the less capacity of the ventricle, as well as a slight diminution in the dimensions of the corpus striatum and optic thalamus. The cases observed by Cazauvieilh were mostly in persons who had arrived at an advanced age. (See Archives Gén. de Méd. for May and July 1827.)

Intermittent Hemiplegia.—A form of hemiplegia, which may be denominated *intermittent*, has been alluded to by Sauvages, Morgagni, and Cullen. Sauvages, by whom the species has been particularly noticed, describes it as coming on every day, and after some hours receding, with an accession of quotidian fever; and he gives a minute account of a case of this kind. The case described by Morgagni was that of a woman aged forty, who, after severe and long-continued headach, became completely hemiplegic; when thus affected, she was likewise seized with the same kind of palsy *on the healthy side* every day towards the evening, which went entirely off as the morning came on. After this disorder had attacked her seven or eight times at nearly the same hour; she died of pneumonia. There was no examination of the body. (See Cooke on Palsy, p. 20.)

A case of this description is recorded by Dr. Elliotson. (London Medical Gazette, vol. vii. p. 486.) The patient, forty-eight years of age, had been in the East and West Indies, and had had fever at Bombay and at Batavia, and had suffered from dysentery and diarrhœa. For two years and a half previous to his admission into St Thomas's Hospital he had been subject to paroxysms, which threw him into the condition of a perfect hemiplegic; totally losing the power of his arm, and "dragged his leg in a semicircular way, as patients usually do when labouring under hemiplegia." The paroxysm began at ten o'clock on every third or fourth morning, and lasted in its full force from three to four hours; "but although it lasted only that time, he was not perfectly clear from it the whole day." The man had a sickly aguish look, and very much the appearance of one who had suffered from a hot climate. Under the supposition that the patient's complaint arose from malaria, he was treated with large doses of sulphate of quinine, five grains every sixth hour, afterwards increased to ten grains. The effect of the medicine was a decided improvement in the general health, and a considerable increase in the intervals between the paroxysms. It does not appear that a perfect cure was effected.

Prognosis. — We believe it is quite consonant with the results of general experience to state, that hemiplegia, connected with an apoplectic condition of the encephalon, is that which is most likely to recover. That the effused blood may be absorbed and leave nothing to indicate the situation it occupied, but a small cavity, is now abundantly proved. But in cases where there is no effused blood, it is obvious that less difficulty exists to restore the brain to its healthy condition, and in these cases accordingly we frequently find the paralysis yield readily and even quickly to treatment. When the effusion has taken place, we sometimes see the disappearance of the palsy and the absorption of the coagulum to proceed *pari passû;* but such an event does not occur so frequently as we might, *à priori*, be led to expect. It sometimes even happens that the coagulum has been completely absorbed, and yet the paralysis continues in no degree diminished. The writer has in his possession a portion of brain of a girl twenty-two years of age, who had been hemiplegic after apoplexy, and continued so, without any recurrence of apoplexy, till her death, one-half of the body being *completely* paralysed. The brain was healthy, with the exception of a small cavity not exceeding four or five lines in diameter, situated about the centre of the left hemisphere, lined with a brownish-coloured membrane, and containing a serous fluid of a similar colour. In fact, it would seem as if, after a certain period, the cerebral lesion and the palsy lost their relation to each other as cause and effect, and the latter continues, as it were, independent of the condition which originally gave rise to it.

[In rare cases of cerebral hemorrhage, there is no paralysis. Cases of this kind occurring to

others, and one occurring to the writer, are referred to elsewhere. (*Practice of Medicine*, 2d edit. ii. 187, Philad. 1844.)]

Treatment of Hemiplegia.—The treatment of hemiplegia varies according to the time which has elapsed since its accession. If the patient be seen immediately after the appearance of paralysis, the practitioner must look accurately to the condition of the nervous system, directing his remedies to that which appears to be the seat of the disease. These remedies, though few, are, when appropriately applied, powerful, and in the diversity of lesions which give rise to the affection under consideration, require the exercise of much judgment and discrimination, in order to their successful employment.

The principal treatment, then, in this early stage of hemiplegia, will depend on the precise nature of its cause, on the general condition of the patient, his age, and previous state. Bleeding, purging, and other antiphlogistic remedies may be adopted where there is decided evidence of plethora, inflammatory or apoplectic. How far these measures may be carried with safety or advantage, the circumstances of each particular case can alone decide; in general, however, it will be found necessary to employ them to some extent, so as to produce a decided effect upon the system of the patient. When all inflammatory symptoms have been reduced, a mild mercurial treatment has often proved extremely useful. Does it in apoplexy promote the absorption of the coagulum? Dr. Prichard observes, respecting the use of mercury in hemiplegia, "that those patients, in whom a slight degree of ptyalism has been produced, have almost uniformly appeared to him to derive material benefit from it, and their recovery has been more complete than that of others in whose cases the same remedy has either not been used or has not been administered to the same extent."

Due attention must of course be paid to regimen. Abstinence from all stimulating elements, solid or fluid, must be rigidly observed in the great majority of cases. In a more advanced stage of hemiplegia, where the urgency of the brain symptoms appears to be either diminished or removed, and where the palsy is the object chiefly worthy of attention, the physician has in view a twofold object,—to prevent a recurrence of head symptoms, and, secondly, to alleviate the condition of the limbs. The former end is to be attained more by avoiding what has a known injurious tendency than by adopting any particular plan of treatment; this, however, is not to be neglected, as a proper regimen does much towards maintaining a uniform state of the general system: we may add that in this stage especial benefit will be derived from allowing the patient to enjoy air and exercise as much as he is able to bear. Change of air and scene are unequivocally of decided advantage, and a visit to some watering-place is often made in this stage of the complaint with marked benefit. Mental serenity and a freedom from the cares of business are indispensable.

To alleviate the condition of the paralysed limbs, the treatment may be applied to the seat of the original disease as well as to the limbs themselves. Thus, with a view to act upon the seat of the primary disease, we have recourse to counter-irritation in the vicinity, or, as some prefer it, more remotely. For this end, we employ setons, issues, blisters, tartar-emetic ointment, or tartar-emetic in powder, sprinkled on the dressings applied to a blistered surface; frictions with liniments containing various irritating substances, among which we may mention the croton oil, as being an extremely severe irritant. Dr. Prichard highly extols the practice of inserting a large issue in the scalp in cases of this kind; he advises an incision to be made completely through the scalp for four or five inches over the sagittal suture, and the edges of the wound to be separated by a row of peas. (Lond. Med. Gazette, vol. vii. p. 427.)

The treatment of the paralytic limbs consists in the use of stimulating applications, with the idea that a stimulus applied to the sentient extremities of the cutaneous nerves may have the effect of rousing from their state of torpor the more deeply-seated trunks. Of these external stimulants we may enumerate the following; dry friction with the hand or by the flesh-brush, a remedy much approved by Dr. Cooke; warm baths; stimulating liniments, prepared of the concentrated acids or the caustic alkalies combined with oil or lard; brine, or a strong solution of sea-salt; terebinthinate applications; sinapisms; blisters. Dr. Cullen has found the use of liquid styrax, in the proportion of one part to two of the old black basilicon, remarkably serviceable in paralytic cases. The application of cold has been recommended, and we have known it beneficial when applied daily in the form of a shower-bath. Some more simple stimulants than those now enumerated have been employed, such as, tickling the parts with a feather, which, according to the statement of Mr. Wardrop, proved beneficial in a case of eighteen months' standing, which recovered in two months. Stinging with nettles was employed by Celsus, and Graefe is said to use the *dolichos pruriens* as an external stimulant applied to the surface, and maintained in apposition with it by means of a bandage. It produces some degree of cutaneous inflammation, but requires frequent renewal.

Among the external stimuli we may mention electricity; the efficacy of this agent in many paralytic cases does not want proof. Lightning has been known to cure paralysis: we extract an anecdote exhibiting this effect of the electric fluid from one of the numbers of the Medico-Chirurgical Review: a vessel on the Atlantic was struck several times with lightning, insomuch that many of the crew were strongly electrified. Among the passengers was a man who had been paralysed in both his inferior limbs for three years. At the time of the electric discharge he lay on his bed, but soon after perceived the return of power to his limbs, and was enabled to rise with perfect use of them. The cure in this case was permanent. A case is related in the Haerlem Transactions, in which a hemiplegic patient recovered the use of his side after a hundred strokes from the *gymnotus electricus*, or electric eel.

Though it must be admitted that electricity is occasionally a successful remedy in palsy, still it has by no means equalled the anticipations at first

entertained respecting it. Its failure may be very well ascribed to a cause which is equally calculated to impair the power of all stimulants over palsied nerves. "Applied in a certain manner," says Dr. Cooke, "electricity is a most powerful stimulant to the nervous system; but as it is also a stimulus to the sanguiferous system, it has often been hurtful in those palsies which depend upon a compression of the brain, and especially when it has been so employed as to act upon the vessels of the head." Great circumspection must be observed, lest in the use of electricity we excite the circulation to such a point as to increase the evil we seek to remedy. Applied as a topical remedy, it will be less apt to produce mischief, and for this purpose the method of *electro-puncture*, already alluded to under the head of Local Palsy, may be resorted to with advantage. The facility afforded of gradually increasing the force of the shock by the employment of the galvanic apparatus, renders galvanism a more safe and suitable agent than electricity; and according to the conclusions of Dr. Bardsley from comparative observations, its efficacy is superior to that of electricity.

But there is a class of internal stimulants which, having a tendency to excite the nervous system so as often to produce convulsive action, have been employed in paralytic cases. Among these we may mention rhus toxicodendron, strychnine, brucine.

The rhus toxicodendron (*poison sumach*) was first introduced by Dr. Alderson, of Hull. A powder from the leaves is given in doses of half a grain three times a day, and its quantity increased to two, three, or four grains, carefully watching its effects. Its most common effect is a twitching or convulsive motion, or a sense of tingling or pricking in the paralytic part. The medicine, like all of this class, does not seem much to be relied upon.

Strychnine and brucine,—the former the active principle of the nux vomica, the latter extracted from the bark of the false angustura, (*brucia antidysenterica,*)—are both remedies of the same class, powerful excitants of the nervous system. Strychnine, however, is much more potent than brucine. Andral ascertained by comparative trials that six grains of brucine were equal in their effects to one grain of impure, or a quarter of a grain of the pure, strychnine: he therefore considers the former a safer medicine than the latter. Both, however, are dangerous and uncertain: dangerous, from the risk of increasing cerebral irritation,—an effect which we have frequently seen; and uncertain, inasmuch as some persons appear more susceptible of their effects than others. Thus, in one individual one-twelfth of a grain of strychnine, produced severe symptoms; and in another the dose was raised to a grain without inconvenience. Andral comes to the conclusion, that in cases where, as if from habit, the paralysis continues after the effusion has been absorbed, the limbs will be improved under the use of strychnine or brucine; that when the brain is still in a disordered state, these medicines have the effect of exciting inflammatory action; but that, in those forms of palsy not dependent on disease of the nervous centres, they are advantageous, as, for instance, in the lead palsy, or that from rheumatism. (Journal de Physiologie, 1823.) Strychnine may be administered in doses of one-twelfth or one-eighth of a grain, gradually and cautiously increased. Brucine may be given in half-grain doses.

The following observations, from Dr. Abercrombie, respecting the administration of stimulants, are well worthy of attention:—"All the remedies of this class must be used with a considerable degree of caution; and perhaps the use of them may be more safe, and may be carried on with a greater degree of activity, if the general system, at the same time, be kept in a very low state by spare living and occasional evacuations. This, I imagine, is always to be considered as an essential part of the treatment, and I cannot agree with some respectable writers, who hold that the diet in paralytic cases ought to be nourishing and restorative. With this precaution, I think it probable that there are many cases of paralysis in which stimulants may be employed with much benefit."

Iodine, in various forms, has been of late years employed in the treatment of palsy. The result of Dr. Manson's (Researches on Iodine, &c.) trials of this medicine are not very encouraging. In scrofulous constitutions, where the paralysis seems immediately dependent on some local development of scrofula, it may be tried with more hope of success than in any other form.

A sudden excitement of the nervous system has been known to carry off the palsy. Thus, a violent fit of mental emotion, anger, fright, have had this effect. The sudden supervention of a fever has likewise removed it: hence Dr. Good recommends as a remedy, in some instances of paralysis, a journey into the hundreds of Essex, or some other marshy district!

Several cases are on record of the spontaneous cure of hemiplegia, as it were by the mere remedial energy of nature. (See Abercrombie, p. 306, et seq.)

3. **Paraplegia.**—It is of importance, for reasons which will presently appear, to decide what is the established acceptation of this term among medical writers. The principal modern writers, as Sauvages, Cullen, Swediaur, Good, (see their Nosological Systems,) Baillie, Cooke, and Rostan, employ the term paraplegia to denote that species of palsy in which the lower half of the body on both sides is paralysed. Much confusion existed among the older writers as to the sense in which they used this term: Hippocrates signifying by it any palsy which was the consequence of apoplexy; Aretæus denoted by it a partial palsy in any situation; Boerhaave and Van Swieten a palsy of all the parts below the neck. Mr. Earle has infringed upon the unanimity of modern writers by endeavouring to revive the definition of Boerhaave and his commentator; for what reason we are at a loss to understand, inasmuch as the etymology (Παρά, vitiose, and πλήσσω, percutio) of the word affords us but little guidance.

We have preferred adhering to the definition of Cullen and others,* as that which is almost universally adopted, and, moreover, because that

* "But there is another form of paralysis, called paraplegia, in which the lower half of the body is more or less impaired in its nervous power."—*Baillie.*

degree of palsy which Mr. Earle employs the term paraplegia to denote, appears to us to come more appropriately under our division of *general paralysis*. When paraplegia is perfect, there is complete loss of the power of motion in the lower limbs, with paralysis of the bladder, rectum, and sphincters; there is also in general a considerable degree of impaired sensation, more, as we have already had occasion to remark, than in any of the other forms of paralysis of motion. Very frequently we find paraplegics more or less affected with spasmodic action in some particular muscles of the lower limbs; sometimes this is confined to the flexor muscles, and we occasionally see a permanent state of flexion of the thighs on the trunk, and the legs on the thighs; sometimes, on the other hand, the extensors are thus spasmodically affected, as in the case of a young man which occurred to the writer, in which there was no power of flexing the lower limbs; but if at the request of the patient they were placed in the state of flexion, (for when in that condition they were more free from uneasiness,) after the lapse of a short interval they were, by short and successive twitchings of the extensor muscles, gradually brought back to the state of extension.

In general there is, along with the palsy of the limbs, paralysis of the bladder and of the sphincters; the former shows itself sometimes by incontinence of urine, but more frequently by retention. All ages are liable to paraplegia, but it occurs more frequently in adults and old persons, and, according to Dr. Baillie, in males than in females.

In the mode of access of paraplegia there is less variety than in that of hemiplegia. The first symptom is generally a derangement of sensation, a sense of numbness in the lower limbs, with impaired power of motion. The weakness of the limbs is further indicated by the patient evincing a tendency to trip when walking, being tired after but a little exertion in that way; complaining of a sense of weight and some degree of pain in the feet and extending up the legs. "The want of power of motion in the limbs, and the inability to preserve the due balance of the body, very much increase, and the person cannot walk without the assistance of one or two sticks, or the aid of some other person, who more or less supports him." (*Baillie*, Trans. Coll. Phys. vol. vi.) The paralysis of the bladder and sphincter next appears, and now the patient is obliged to confine himself to his bed; there is a great tendency to sloughing of the nates, or of any part on which there is prolonged pressure; in some cases a communication has been produced between the rectum and bladder, thus affording the patient a relief from retention by converting it into incontinence of urine. The secretion of the kidneys seems a good deal affected in this complaint; the urine seems prone to calculous deposit, a remark which we believe originated with Dupuytren, who observed that catheters left in the bladders of paraplegics became more quickly encrusted with calculous matter. Sometimes there is a remarkable degree of flatulency of the abdomen, amounting even to tympanitis. The uterus is likewise found to be incapable of its contractions in cases of paraplegia. This fact was observed by M. Brachet of Lyons, who had a patient who became pregnant during the existence of the paraplegia: it was necessary to effect delivery by the forceps. It may be stated that the same physician found, by experiments on animals, that injury to the lumbar portion of the spinal marrow destroyed the contractile power of the uterus.

This form of palsy may depend on disease of the brain or of its membranes, or of the spinal cord or its membranes, or disease of the vertebræ or the uniting ligaments. It was not very long ago supposed that paraplegia resulted only from spinal disease, and Dr. Baillie was the first to call the attention of the profession to its dependence on diseased brain, the spinal cord being perfectly healthy. If diseased brain can produce a palsy of one lower limb, as in hemiplegia, why should not a more extensive or differently situated disease produce palsy of both lower limbs? Were the views of Foville regarding the influence of the corpora striata over the lower extremities established, it is obvious that the effect of simultaneous disease in both would be the production of paraplegia. It must be confessed, however, that the general symptoms of paraplegic palsy chiefly resemble those resulting from spinal disease: the tendency to spasm, the frequent impairment of cutaneous sensibility, the absence, in many instances, of any of those symptoms which so often precede or accompany cerebral disease, are so many circumstances connected with paraplegic which favour the above opinion. Admitting, however, the possibility of the production of paraplegia by cerebral disease alone, we cannot but consider that, as a practical question, it is still *sub judice*, and that chiefly from the too frequent neglect of examining the spinal marrow. Thus we read reports of cases of this affection where post-mortem inspection discloses marked disease of the brain; but from no examination of the spinal marrow having taken place, we can arrive at no satisfactory conclusion. A case of this kind is reported in Dr. Abercrombie's work. The patient was a boy, seven years of age, and before death was blind, epileptic, and paraplegic. Examination after death discovered a firm white tumour, the size of a large bean, lying over the junction of the optic nerves. There was extensive effusion to the amount of twelve ounces in the ventricles, and both hemispheres of the cerebellum were diseased; the left being much indurated, the right reduced to a mass of unhealthy scrofulous suppuration. The spine was not examined.* Who could venture, in the true spirit of philosophy, to state to what cause the paraplegia was attributable in this case?†

Perhaps the greatest difficulty which the practitioner has to encounter in the consideration of a case of paraplegia, is to determine the precise seat of the lesion which gives rise to it. In some cases there are unequivocal signs of spinal dis-

* *Abercrombie*, p. 182. In a case by Mr. Earle, the lower part of the spinal marrow was not examined, yet it is headed "Paraplegia from Disease of Brain." Med Chir. Trans. v. xiii. p. 530.

† See an interesting paper on paraplegia in the Med. and Phys. Journal for June 1827, by Dr. Burder, who considers that those cases of paraplegia which are coincident with cerebral lesion, are caused by the increased *spinal* effusion consequent on that lesion.

ease, such as great tenderness on percussion over a particular portion of the spine; alteration of the form of the spine; projection of one or more vertebræ. Mr. Copeland has adopted a very simple and obviously useful expedient in obscure cases to ascertain the locality of spinal irritation; he takes a sponge dipped in water as hot as can be borne, and passes it down the whole length of the spine; and if there be any irritation confined to a particular spot, the patient will evince it by expressing pain, and wincing as the sponge passes over that region.

The habit of the patient, his previous mode of life, as well as the symptoms immediately preceding the attack of paralysis, will assist the practitioner to discover whether any cerebral affection is complicated with the spinal disease; thus in some instances, as Mr. Earle remarks, there is an impaired state of some of the external senses, accompanied with vertigo, a sense of weight on the head, and a general disturbance of the cerebral functions; in some there is likewise derangement of one or more of the mental faculties. In such cases there can be little doubt of at least *the complication* of cerebral disorder. "But," as Mr. Earle adds, "it is in slighter and more chronic cases that it is often difficult to form a correct opinion; yet to establish a correct diagnosis in such cases is of the utmost importance both with respect to the probable termination of the case and with reference to the proper treatment to be adopted, that we may not subject the individuals to useless suffering from the application of caustic issues and setons to the spine, and the disappointment which would follow." To obviate this difficulty, Mr. Earle has proposed an expedient which we shall give in his own words: "It is well known that when a nerve is stimulated or injured in any part of its course, the painful sensation is referred by the percipient mind to the sentient extremity of such nerve; the familiar instance of the pain referred to the extremity of an amputated limb may be adduced in proof of this. The exact reverse of this takes place when there is a partial paralysis arising from morbid affection of the cerebral organs. Here the centre of the sensorial functions being impaired, it appears to be incapable of transmitting its influence to the extreme parts of the body; in such cases, if the nerves supplying the limbs be irritated, *they will convey the impression of such injury only part of the distance down the limb, about as far as the commencement of the paralytic affection.* I have repeatedly examined cases of paraplegia from affection of the spine, and in no one instance have met with the same phenomenon, which I have therefore been induced to consider as diagnostic of the paralytic affection being dependent on disease of the brain or its membranes; which opinion has in several instances been confirmed by examinations after death, in which both brain and spinal marrow have been carefully investigated." It is hardly necessary to mention that paraplegia is a frequent result of concussion and other spinal injuries.

Treatment of Paraplegia.—As topical remedies are chiefly applicable in this form of palsy, it must be obvious of what importance it is to ascertain to what region they may be most advantageously applied. Cupping and leeching are, in the generality of cases, primarily indicated. Counter-irritation by blisters, issues, setons, moxas, &c. may then be had recourse to. Purgatives are to be administered as they may appear necessary; and Dr. Baillie's mode of treatment is well calculated to be serviceable; he directed a grain of calomel, or five grains of the pilula hydrargyri, with one grain of dried squills, to be taken every night for many weeks; these were followed by purgatives.

The same treatment of the palsied limbs may be adopted here as that alluded to under the head of hemiplegia. The palsy of the bladder will require the introduction of the catheter, and we would merely allude to the necessity of using pressure above the pelvis to ensure the complete expulsion of the urine.

Certain mineral poisons, viz. mercury, lead, and arsenic, give rise, when received to a great extent into the system, to a form of palsy which Cullen has denominated *venenata*. The palsy resulting from mercury and lead has already been so fully treated of that we think it needless to allude further to it here. (See Artisans, Diseases of, and Colica Pictonum.)

Palsy has, in some cases, followed the use of arsenic, chiefly where it had been taken or administered as a poison. In some of the cases related by Orfila, the palsy was not extensive, and appeared a short time before death. In a young man whose case is related in the Medical and Physical Journal, there was paralysis of the four extremities, which continued for some time, and ultimately proved fatal.

Paralysis Agitans.—[*Shaking Palsy.*]—The peculiar affection thus denominated by Mr. Parkinson is the *scelotyrbe festinans* of Sauvages, and from the peculiarity of the patient's gait has been called by Dr. Good synclonus ballismus (βαλλίζω, *tripudio.*)

Mr. Parkinson's description of the disease is the best we possess; we therefore subjoin it. "So imperceptible is the approach of this malady, that the precise period of its commencement is seldom recollected by the patient. A slight sense of weakness with a proneness to trembling, sometimes in the head, but most commonly in the hands or arms, are the first symptoms noticed. These affections gradually increase, and at the period perhaps of twelve months from their first being observed, the patient, particularly while walking, bends himself forward. Soon after this his legs suffer similar agitations and loss of power with the hands and arms. As the disease advances, the limbs become less and less capable of executing the dictates of the will, while the unhappy sufferer seldom experiences even a few minutes' suspension of the tremulous agitation; and should it be stopped in one limb by a sudden change of posture, it soon makes its appearance in another. Walking, as it diverts his attention from unpleasant reflections, is a mode of exercise to which the patient is in general very partial. Of this temporary mitigation of suffering, however, he is now deprived. When he attempts to advance, he is thrown on the toes and forepart of his feet, and impelled unwillingly to adopt a running pace, being in danger of falling on his

face at every step. In the more advanced stage of the disease, the tremulous motions of the limbs occur during sleep, and augment in violence till they awake the patient in much agitation and alarm. The power of conveying the food to the mouth is impeded, so that he must be fed by others. The torpid bowels require stimulating medicines to excite them into action. Mechanical aid is often necessary to remove the fæces from the rectum. The trunk is permanently bowed; muscular power diminished; mastication and deglutition are difficult, and the saliva constantly dribbles from the mouth. The agitation now becomes more vehement and constant; and when exhausted nature seizes a small portion of sleep, its violence is such as to shake the whole room. The chin is almost immovably bent down upon the sternum; the power of articulation is lost; the urine and fæces are discharged involuntarily, and coma with slight delirium closes the scene." (Parkinson's Essay on the Shaking Palsy. London, 1817.)

But few cases of this disease are recorded: it possesses many points of similarity to chorea, or to the palsy from mercury, which has been better termed *tremblement mercuriel*. It is therefore to be distinguished from these diseases as well as from the trembling which succeeds the abuse of spirituous liquors; that which proceeds from the immoderate use of tea or coffee; or that which appears to be dependent on old age. In these cases the agitation ceases if the trembling limb be supported, and none of its muscles called into action; whereas, in the real shaking palsy, the reverse takes place; the agitation continues in full force whilst the limb is at rest and unemployed, and even is sometimes diminished by calling the muscles into employment. To this we may add the peculiarity of gait evinced here; "*the patient, when he attempts to walk, being impelled unwillingly to adopt a running pace*," —a symptom which we would be disposed to consider as pathognomonic.

All is conjecture respecting the anatomical condition of the nervous centres in this disease: the symptoms, however, seem strongly to favour the opinion of Mr. Parkinson, that there is spinal disease, and in the cervical portion of the spinal marrow.

The treatment consists in the adoption of the same measures which are applicable in all forms of palsy dependent on spinal diseases.

R. B. Todd.

PARAPLEGIA. See Paralysis.

PAROTITIS, (from παρωτις, the parotid gland,) inflammation of the parotid gland, *mumps*. Inflammation of the parotid gland is an occurrence which may be the effect of the common causes of inflammation generally, in healthy persons, as of exposure to cold or local injury; or it may be secondary, and consequent to a cachectic state of the body or already existing disease, as in strumous subjects, and as it takes place occasionally in a subacute form at the termination of fevers, to which it has sometimes appeared to be critical. Parotitis is now and then observed to follow the inflammatory eruptive diseases, as measles, small-pox, and scarlatina; and occasionally to come on as if from the absorption of acrid matter from diseases of the surrounding parts, as eruptions or excoriations. Lastly, parotitis presents itself as a peculiar and probably a specific disease, characterised by the duration of its inflammatory stage, and originating from no manifest exciting cause, except contagion. As it occurs under all but the last-mentioned circumstances, the affection corresponds to the *parotis* of some of the ancient writers, and to the *phlegmone parotidæa* of Mason Good: the exception constitutes the *empresma parotitis* of the same nosologist, and the cynanche parotidæa of Cullen, its more general nosological appellation at the present period.

Parotitis, from whatever cause it may arise, is characterized by tumefaction of the parotid gland, recognisable by the eye and hand of the examiner, together with local pain increased by and rendering difficult the natural movements of the lower jaw, and giving rise to febrile symptoms more or less severe. The modifications of it which seem to arise from various causes, and *not* from contagion, we shall refer to under the term simple parotitis; that which has the more peculiar character, commonly known by the name of cynanche parotidæa, we propose to treat of afterwards, under that name, as a distinct disease.

1. *Simple Parotitis* presents, in most of its circumstances, phenomena similar to those of inflammation in other parts which have the same relative approximation to the surface of the body, namely, local pain, tumefaction, and increased heat, and, as it advances, redness of the superjacent integuments; added to these, there is occasionally a sense of throbbing about the parts, with headach and other cerebral disturbance, and occasionally even difficulty of respiration and deglutition. The degree of fever which accompanies it is proportionate to the extent of the local affection and the irritability of the subject. At an uncertain period, simple parotitis terminates in resolution, with subsidence of the febrile symptoms, or goes on to suppuration or abscess and ulceration, and may even end, although it very rarely does so, in gangrene and death.

Parotitis is often so transient and little distressing to the patient as to yield to the mere promotion of warmth to the part by covering it with flannel or any other additional wrapper; and it may be well to remark here that warm applications to the angle of the jaw, in all inflammatory swellings of the parotid gland, contribute much more to the mitigation of pain and other consequent symptoms than the cold epithems usually found to give relief in inflammation of other parts. When parotitis is more severe, detraction of blood from the region of the inflamed gland will be further necessary; to be followed up by constitutional treatment of the antiphlogistic kind, proportioned to the general effects of the local disease. If, nevertheless, suppuration should not be prevented, an early outlet should be made for the contents of the abscess, and the treatment of this and every other stage of the disease pursued on the principles laid down in the article Inflammation.

The subacute inflammation of the parotid gland, which is occasionally found in complica-

tion with scrofula and other diseases, is, in fact, a manifestation of them, and pertains to their discussion in other parts of this work. When consequent to acute or eruptive fevers, the primary inflammatory stage is rarely if ever to be recognised, and an abscess of the gland proclaims that it has existed. An early evacuation of the contained pus will be the direct medium of relief, and the treatment of debility consequent to such diseases, of which it is generally an indication, the method to be pursued for the further restoration of health.

When parotitis is a consequence of any particular state or disease of the adjacent parts, the removal of its cause must be the first object of attention. Leeches, however, applied to the region of the enlarged gland will give relief, and their repeated use may be necessary to counteract the continued operation of an irritant, the removal of which perhaps cannot be immediately effected.

2. *Cynanche parotidæa* is that species of parotitis commonly known in this country by the name of *mumps;* in Scotland called *branks;* and in France *oreillons* and *ourles*. It is almost universally admitted to be contagious; it is often endemic, and sometimes epidemic. It commences with the local symptoms already mentioned as common to parotitis in general, but the tumefaction, which is at first distinct, soon extends to the maxillary glands, (if the latter be not synchronously affected,) over a considerable part of the throat; the disease is frequently developed in the glands of both sides, but sometimes only of one; febrile symptoms, varying in degree, but usually slight, are also present, and increase as the swelling advances, until about the fourth day, when both the local and constitutional disorder begin to subside; and within as many, or sometimes a few more, they entirely disappear. As the tumefaction diminishes, it not unfrequently happens that the testicles in the male sex, and the mammary glands in females, begin to increase in size, become hard and somewhat painful, but in this country soon again recover their former state. Experience has proved that this local determination is a favourable omen, for its non-occurrence as well as its expulsion have been frequently succeeded by inflammation of some other organ, generally the brain or its membranes, and even death has been the unfortunate issue.

In cynanche parotidæa the inflammation of the gland rarely if ever terminates in suppuration, but almost always manifests a tendency to resolution, on or about the fourth day of its progress.

When the inflammation has been confined to the glands on one side, the translation above noticed has generally also been evinced in the corresponding testis or breast.

A large majority of persons have passed through life without ever having suffered from this disease, and it is not common to find that it has been experienced a second time. We are not aware that its prevalence is peculiar to either sex, but children are generally the subjects of it, and more frequently those of a strumous diathesis: in such subjects, an occasional and apparently consequential occurrence is a more decided development of struma in the glands which have been the seat of vascular excitement. At sea, it has occasionally happened that cynanche parotidæa has attacked a number of sailors in the same vessel, when the cause of its first appearance has not been very evident; for, although besides contagion, exposure to cold and humidity have been commonly considered its exciting causes, it has occasionally arisen without any evident reason to suspect that it has been the effect of either.

Treatment.—Common observation has taught that cynanche parotidæa might in most instances be safely allowed to proceed without other care than that of guarding against exposure to cold of the general surface of the body, but particularly of the local swelling; by the abstinence from food and drink of a stimulating quality, with the occasional exhibition of gentle laxatives, purgatives having sometimes appeared to occasion a metastasis of the inflammation to another organ. To promote local warmth, the usual application of flannel round the neck and jaws is congenial alike to the feelings of the patient, and calculated to counteract the proneness to metastasis of the inflammatory action. When one or both of the mammary glands or testes are only slightly affected, a continuation of the same plan of treatment will generally be found adequate in aid of the natural actions of the body; but if the inflammation should be excessive, either in the original or consecutive stage of the disease, the antiphlogistic line of treatment must be more rigidly adhered to; topical detraction of blood by leeches, or, when the testis is the organ requiring relief, by several small punctures, with a lancet, of the superficial vessels of the scrotum, must be adopted, and even general bloodletting in further relief of the system. The depleting plan should be extended to the more active saline aperients, and to diaphoretic and diuretic medicines of the same class with antimonials, to be selected and varied on the general principles of therapeutics, according to the particular exigencies of the individual subject of the disease.

The well-established fact in pathology, of the tendency to metastasis of inflammation from its original seat to some other organ in cynanche parotidæa, renders it an important axiom that cold applications, whether to the parotid, maxillary, or mammary glands, or to the testes, should be carefully avoided, at least whilst the progressive steps evince the peculiar character of this disease. The secondary as well as original inflammation, when confined to these glands, will be soonest relieved by hot fomentations and the continued application of flannel: when leeches have been applied, as before advised, the same object will be further promoted by enveloping the part in a bread-and-water poultice, which should be renewed at intervals of six hours. Observance of the horizontal posture, the warmth of bed, and a suspending bandage, when the testis is enlarged and painful, will also be important auxiliaries. If, unfortunately, a metastasis should occur, and the brain or its membranes (which under such circumstances is most common), or any other structure become the seat of the vicarious inflammation, the new form of disease must be the immediate object of attention, requiring precisely the same treatment as if it were wholly unconnected with its precursor, whilst at the same time

an attempt should be made to divert the inflammatory action to the organ from which it has receded, by the immediate application to the latter of hot fomentations, and subsequently by local irritants: blisters have been usually recommended for this purpose, but as the probabilities of success (at all events very slight), it is reasonable to suppose, would diminish in proportion to the length of time from which the inflammation had left the particular organ, a sinapism, we conceive, on account of its quicker action, would be preferable. [It may admit, moreover, of doubt, whether the irritation produced by a blister or sinapism, may not also be transferred to the seat of the metastasis, and add to the irritation there.]

In advanced life, Dr. Mason Good observes, cynanche parotidæa is apt to run into a chronic form, accompanied with symptoms formidable in their nature. This is more especially apt to take place, he adds, in females when menstruation is on the point of ceasing, and the general action of the system labours under some disturbance. The tumour should, if possible, be carried off by leeches and cooling repellents, as he further advises, urging as a reason that if it proceed to suppuration, which it tends to, though very slowly, the ulcer rarely heals, usually degenerating into a foul offensive sore that sinks deeper and spreads wider, resisting all medical treatment, and at length destroying the patient. Vomits, frequently repeated, he continues, have in this case been found highly serviceable, and those of the antimonial preparations rather than ipecacuanha, from their maintaining a longer action, and determining more effectually to the surface, or rather to the excernents generally.

WILLIAM KERR.

[PARTURIENTS; from *parturio*, 'I bring forth.' 'Substances that promote the parturient energy' are thus designated by the writer. The term has been objected to, (*Brit. & For. Med. Rev.* Jan. 1844, p. 244,) and is objectionable; but it is not so easy to propose one more appropriate. *Abortives, Amblotics, Phthorics, Apophthorics,* and *Ectrotics,* used at times, are certainly not less objectionable. Fifty years ago, no one, in this country, would have ventured to affirm, that the lists of the materia medica comprised any agents possessed of the virtues ascribed to parturients. In Germany, indeed, ergot has long been regarded in this light, as its old German names, *mutterkorn,* ('womb-grain,') and *gebärpulver,* ('parturient powder') sufficiently testify. Within the period specified, ergot has been brought to the notice of the profession here, and elsewhere, and has received so many testimonials in its favour as to cause its admission into every work on materia medica. In no country has it been more employed than in the United States, and in none has it so many supporters. Yet there are many who, from their experience, are not satisfied, that it exerts the power over the gravid uterus, that has been ascribed to it. It must be admitted, as the writer has elsewhere remarked, (*General Therapeutics and Materia Medica*, i. 422, Philad. 1843,) that no cases could present themselves, in which it is more difficult to trace accurately the relation between cause and effect. Every one who has practised extensively in obstetrics must have observed, that the parturient efforts occasionally flag, and, indeed, are wholly suspended; yet they recur, and the labour proceeds rapidly to a favourable termination; and if in any such case a remedy, presumed to be parturient, were administered during the period of the cessation of pain, the recurrence of the pain in this sudden manner could hardly fail to be ascribed to the administration of the presumed parturient. Let the obstetrical practitioner, who has never had recourse to any such agent, call to mind how few the cases are in which delivery has had to be aided, in consequence of the *total* cessation of the pains, and how common it is to meet with a partial or temporary cessation; and he will see, that the absolute necessity for the use of a parturient is not a common occurrence.

But if hesitation be indulged in allowing the ergot any special powers over the uterus, there can be none in denying such powers to other reputed parturients. They are all indirect agents, and act only upon the ovum through the mother, endangering her life, as well as that of the new being. The drugs and agencies employed with the view of inducing abortion are of the most powerful kind,—emetics, drastic cathartics, acro-narcotic poisons, &c., &c. Many of the German writers, indeed, (Schroff, *Taschenbuch der Arzneimittellehre, u. s. w.* s. 108,) ascribe to borax a specific influence over the uterus by which it is supposed to favour the catamenial secretion, the pains of parturition, and the lochial discharge, when their failure is dependent upon inactivity of the organ. Dr. Copland (*Dictionary of Practical Medicine*, art. ABORTION) recommends it combined with ergot, in cases of abortion, when the embryo only is expelled—the appendages being retained, and the hemorrhage great.

ROBLEY DUNGLISON.]

PELLAGRA, or PELAGRA. This is the name of a disease in which a morbid condition of the skin is a prominent symptom, very prevalent amongst, if not exclusively peculiar to, the peasantry of the northern states of Italy: the word pellagra is obviously a compound from the Latin *pellis*, the skin, and *agria*, "scabies fera," signifying an inveterate eruption.

The earliest account given of pellagra is from the pen of Francis Frapoli, a physician of Milan, and was published in the year 1771; since which period it has been the subject of a great deal of discussion and controversy amongst the Italian practitioners and medical writers. Of our own countrymen, Dr. Holland (so far as we have been able to ascertain) is the first whose description of the disease was founded on personal observation; and excepting a recent sketch of its prominent features by Dr. James Johnson, his paper is the only one in our literature to which the desirable distinction of originality can be attached: it has not, however, escaped the attention of Parr and Hooper, (Medical Dictionaries,) and has been noticed by Good under the title of Elephantiasis Italica, and by Alibert under that of Ichthyosis Pellagra. Dr. Holland has expressed himself decidedly of opinion that it should be classed among the impetigines, but has remarked its resemblance to an inveterate degree of Psoriasis or

lepra vulgaris, admitting also that it has some affinity to ichthyosis. [See, also, L. V. Lagneau, art. Pellagre, in *Dict. de Méd.* xxiii. 373, Paris 1841; and art. Pellagra, in *Encyclopädisches Wörterb. der Medicinisch. Wissenschaft.* xxvi. 444, Berlin, 1841.]

General observation has determined that there is considerable variability in the symptoms of pellagra, and that they are often complicated with other forms of disease; a fact which, with the circumstances of the protracted period of its entire development as well as of its intermitting appearance and remissions, may in a great measure account for the conflicting opinions concerning its nature and history. The poor are almost exclusively its victims; and of these chiefly the peasantry and such as are occupied in agriculture. In the ordinary form of its occurrence, according to Dr. Holland,* it first appears as a local disease of the skin, preceded, however, occasionally by languor, debility, and other indications of a general cachectic state of the body. The local symptoms very generally show themselves, in the first instance, early in the spring, at the period when the midday heat is rapidly increasing, and when the peasants are most actively engaged in their labours in the fields. The patient perceives on the back of his hands, on his feet, and sometimes, but more rarely, on other parts of the body exposed to the sun, certain red spots or blotches, which gradually extend themselves, with a slight elevation of the cuticle, and a shining surface, not unlike that of lepra in its early stage. The colour of this eruption is a somewhat more obscure and dusky red than that of erysipelas: it is attended with no other uneasy sensation than a slight pricking or itching, and some tension in the part. After a short continuance in this state, small tubercles are frequently observed to arise on the inflamed surface; the skin almost always becomes dry and scaly, forming rough patches, which are excoriated and divided by furrows and rhagades. Desquamation gradually takes place, which, though it leaves behind a shining unhealthy surface in the parts affected, yet in the first year of the disease is rarely followed by a repetition of the appearances just described. Towards the close of summer, or occasionally still earlier, the skin has resumed its natural appearance; and but that the further progress of the disease is familiar to every inhabitant of the country, the patient might be led to flatter himself that the evil was gone by, and that there was no particular reason to dread its recurrence.

With this local affection are connected, even in the first period of the disease, certain general symptoms, important inasmuch as they indicate the constitutional nature of the malady; namely, debility of the whole body; vague and irregular pains of the trunk and limbs, but especially following the track of the spine and dorsal muscles; headach with occasional vertigo; irregular appetite, and general depression of spirits. The bowels are for the most part lax, and usually continue so in the further course of the disease. There are no febrile symptoms, and in females the menstruation is generally continued without irregularity.

The remission which the patient obtains during the autumn and winter of the first year is almost universally followed by a recurrence of his symptoms, in the ensuing spring, under a more severe form, and with much greater disorder of the constitution. The cutaneous disorder returns and spreads itself more extensively, but, as before, affecting chiefly the hands, neck, feet, and other exposed parts of the body. The skin becomes callous and deeply furrowed; and large rhagades show themselves, especially among the articulations of the fingers. The debility is greatly increased, frequently depriving the patient of all power of pursuing his active labours, and rendering him peculiarly susceptible of all changes of temperature. Partial sweats break out without any obvious cause. All the nervous symptoms of the first year are renewed in a more severe degree; there is a general tendency to cramp and spasmodic affections; the mind begins to suffer under the disorder, and the feeling of anxiety and despondence is very strongly marked. The *libido inexplebilis*, mentioned by some writers as one of the characteristic symptoms of pellagra, did not come under Dr. Holland's notice, and he is disposed to believe that it has been so considered from the credulity common upon this topic, or to a desire of associating the disease more closely with the leprosy as described by ancient writers. The other symptoms already noticed make progress as the heat of summer advances, and with greatest rapidity in those patients who are much exposed to the sun. As in the preceding year, they begin to decline towards the middle or end of autumn, but the remission, as well of the local affection as of the general disorder is much less complete than before, and the patient continues to suffer during the winter from the debility and other effects consequent upon the disease.

In the third year, every symptom is renewed at an earlier period, and in an aggravated degree. The constitutional malady shows itself under a variety of forms, some of the symptoms having a considerable analogy to those of scorbutus; all of them indicating a general cachexy, and more particularly a lesion of all the voluntary functions. The debility now becomes extreme: the patient is scarcely able to support himself; and the limbs, besides their feebleness, are affected with pains, which still further impede the power of motion. The diarrhœa continues, and tends, of course, to augment the patient's weakness. Frequently a dysenteric state comes on in the latter stages. The breath is generally fetid, and the odour of the perspiration often extremely offensive. The appetite and digestion are irregular, yet, on the whole, perhaps less affected than most of the other functions. Dropsical effusions are now apt to supervene,—occasionally ascites, but more commonly anasarca. Vertigo, *tinnitus aurium*, and double vision are almost universally concomitants of this stage of the disorder, and all the senses become exceedingly impaired. Some spasmodic affections are very general, and these not unfrequently of an epileptic character.

Connected with these latter symptoms is the effect which the pellagra produces upon the minds

* See his valuable paper on the subject, published in the eighth volume of the London Medico-Chirurgical Transactions.

of the sufferers, which effect forms one of the most striking circumstances in the history of the disease. The anxiety, watchfulness, and moral depression of the patient are rapidly augmented. The unhappy objects seem under the influence of an invincible despondency: they seek to be alone; scarcely answer the questions put to them, and often shed tears without any obvious cause. Their intellectual faculties and senses become alike impaired, and the progress of the disease, where it does not carry them off from debility and exhaustion of the vital powers, generally leaves them incurable idiots, or produces maniacal affections, which terminate eventually in the same state. "In demonstration of this tendency of the disease, I may mention the fact," says Dr. Holland, "that at the time I visited the Lunatic Hospital, at Milan, there were nearly five hundred patients, of both sexes, confined there, of which number more than one-third were pellagrosi, people brought thither by the termination of their disorder either in idiocy or mania. Even this statement gives little adequate idea of the nature of its ravages. The public hospitals of the country are far from sufficient to receive the vast number of persons affected with the pellagra; and the greater proportion perish in their own habitations, or linger, wretched spectacles of fatuity and decay. Where debility, as generally happens, is the cause of death, it manifests itself in the latter stage with the usual concomitants of colliquative diarrhœa, spasmodic affections, and coma, and produces a degree of emaciation scarcely to be surpassed in any other disease."

"Though, for the sake of brevity," continues Dr. Holland, "I have described this train of symptoms as going on from the third year, I may remark that the pellagra is generally of longer duration, and that other intermissions usually occur in its progress, giving the patient a certain relief in the degree of his sufferings, though little hope as to the issue of the disease. In some instances, the cutaneous affection forms the principal indication of the complaint for several successive years, being renewed every spring, and disappearing again every autumn. In other cases, where it has been found possible to remove the patient to a new situation and mode of life, the disease is still further arrested in its progress. It rarely happens, however, that these means can be practically adopted, and the constitutional malady is generally so far established in the third or fourth year, that little hope remains of benefiting the patient either by medicine or change in the mode of life."

[At times, according to a recent writer, (L. V. Lagneau, *op. cit.* xxiii. 373,) the insanity assumes the religious form, with tendency to suicide, degenerating occasionally into homicidal monomania, which is directed by preference to children. Numerous examinations of the dead, made in the Hospital Saint Ambrosia, at Milan, by MM. Panceri,—father and son,—assisted by M. Brière de Boismont, (*Ibid.* or *De la Pellagre et de la Folie Pellagreuse*, Paris, 1834,) established most incontestably that these mental aberrations were owing to chronic meningitis, often extending into the vertebral canal. M. Brière de Boismont likewise found the digestive organs of all manifestly diseased, and presenting evident traces of inflammation.]

To enumerate all the symptoms which the Italian writers have attached to pellagra would, in fact, involve a description of several diseases with which it is complicated: it appears, however, that such complications are characteristic of this peculiar malady, and equally so their occurrence under several varieties of form. At different periods, in the same individuals, the morbid condition of the skin has exhibited the appearance of erysipelas, lepra, psoriasis, elephantiasis, and ichthyosis, and of such as are usually termed constitutional disorders, in which it appears to merge: scorbutus, tetanus in its varied forms, chorea, epilepsy, convulsions, dropsies, melancholia, mania, and marasmus, form a condensed list. "It is on this account," Dr. Johnson has observed, "that we see written over the beds in the Milan Hospital the various diseases to which pellagra forms the adjective, as atrophia pellagrina, phthisis pellagrina, hydrops pellagrinus, paralysis pellagrina, mania pellagrina, &c." (Change of Air, or the Pursuit of Health, by James Johnson, M.D. p. 75.) Jansen, one of the most esteemed authors on this subject, states that the cutaneous affection sometimes disappears, but without any mitigation in the other symptoms, and that a person accustomed to see this disease would at once recognise it by the peculiar odour of the perspiration the patients are often bedewed with, compared by him to the smell of mouldy bread. In the advanced stage, the victim of pellagra (the *mal de misère*, as it has been emphatically called by Vaccari,) experiences, in an extreme degree, the effects of irritation in all the mucous surfaces, whilst at the same time the sensibility of the nervous system seems to be infinitely increased. The whole mouth becomes painful, tense, and phlogosed; the palate cleft; the gums swelled, fungous, and bloody; the tongue dry and blackish, and covered with a muddy coating: the teeth blacken and fall out; aphthous ulcerations are not uncommon, and the saliva, which is extremely salt, is frequently secreted in such a quantity, particularly in the morning, as to constitute complete ptyalism: the voice is sometimes so changed as not to be recognisable, and, as may readily be imagined, the thirst is excessive; the latter, however, is the only constant and invariable one of this group of symptoms. As the disease proceeds, diarrhœa becomes uncontrollable, and prior to the fatal issue the emaciation is excessive; but sometimes the patient is said to have the appearance of a mummy. Nervous sensations of a very distressing and peculiar kind also accompany the latter stage; they have been described as a sense of burning heat of the head and spine, radiating to the other parts of the body, and extending particularly to the palms of the hands and to the soles of the feet; occasionally as if an electric spark or flash of fire issued from the brain, and darted through the eyes, ears, and nostrils; all kinds of imagined noises distract the unhappy sufferer; saws, grindstones, mills, hammers, bells, the chirping of birds, and buzz of insects, at one time or another, appear to assail his ears; and thus deprived of sleep or rest, in the summit of despair, it not unfrequently happens that suicide is resorted to; an act which (as if

the means were indicated by some physical association) is often accomplished by drowning, so often as to have induced Strambi to distinguish this particular hallucination by the title of hydromania. (Dict. des Sciences Méd. art. *Pellagra.*)

The consideration of pellagra has been encumbered with a variety of discordant and trivial distinctions. Frapolli, for instance, has divided it into the incipient, the confirmed, and the incurable; Gherrardini into slight, severe, and desperate; Soler into the dry and moist, from some supposed difference in the disorder, according as it appears in dry and elevated situations, or on the flat and moist surface of the plains; and Titius into the latent and manifest, in conformity with the presence or absence of the eruption, the latter being a peculiarity in the manifestation of the disease, but attested by Italian authorities of respectability, amongst whom are Cevri and Zanetti.

It appears that the knowledge of the nature of pellagra has been as yet but little extended by pathological investigation. "In some patients," says Dr. Holland, "the liver, in others the spleen, has been found enlarged and indurated; marks of disease are also occasionally seen in the intestines and mesenteric glands, but these appearances are by no means constant, and may more reasonably be considered as effects than causes of the disease."

Dr. Johnson, in his notice of some cases of mania pellagrina, collected from the great hospital at Milan by M. Brière de Boismont, who visited Italy in 1830, has included the following remarks on the pathology of the disease by that writer: "there is a collection of yellowish serum between the membranes and in the cavities of the brain; congestion of the vessels of the pia mater, plexus choroides, and of the cerebral substance; suppuration and hardening of the brain itself; inflammation of the spinal chord and of its membranes, accumulation of serum in the pleural cavities; inflammation and abscesses of the lungs; ulcers of the trachea; dropsy of the pericardium and of the abdomen; chronic peritonitis; ulceration of the stomach and intestines; hypertrophied tubercles, and scirrhus of the liver, &c." (Medico-Chirurgical Review, Jan. 1833.)

The period at which pellagra first made its appearance, is a point that has been much disputed by the Italian and German physicians, without any satisfactory conclusion. According to Moscati, a Milanese of great repute in science, and some other writers, it has not been known in Lombardy more than between sixty and seventy years. Allioni, who has attempted to estimate the various opinions on the subject, dates its rise in the year 1715, though the attention of the Milanese physicians was not drawn to it until 1740. Strambi, who was appointed by Joseph II. the director of an hospital established at Lagnano, near Milan, for the reception of pellagrosi, had the best opportunities of gaining information on the subject. In his treatises on the pellagra, published in three successive years, from 1784 to 1787, he mentions the fact of his having seen many pellagrosi in the hospital, who gave him distinct assurances of their fathers and grandfathers having had the disorder, and from some particular instances he thinks himself entitled to believe that the pellagra must have been known in Lombardy sixty or seventy years before the time when he wrote. Frapolli contends also for its antiquity, but it may be questioned whether his opinion does not rest on the mere analogy of a name, it having been formed from the circumstance of a minute in the journal of the Milan Hospital, dated the 6th of March, 1578, which provides for the reception of patients attacked with the disease known at that time under the name of *pellarella.*

The pellagra, as an endemic disease, prevails chiefly in the provinces of Lombardy, lying between the Alps and the Po. This country may be briefly described as a vast surface of alluvial plain, little elevated above the sea; but rising on its northern side into chains of hills, which intermediately connect it with the Swiss and Tyrolese Alps. From the long, narrow, and profound lakes among those hills the numerous rivers issue, which, flowing southwards to the Po, and giving their waters into a number of artificial channels for the purpose of irrigation, maintain that extraordinary fertility of soil for which the plains of Lombardy have long been celebrated. The principal objects of cultivation on these plains, besides the vineyards extensively spread over their surface, are maize, rice, and millet. In some districts, and particularly between the rivers Adda and Tercino, the pastures are extensive, and yield a considerable produce of milk, from which the Parmesan cheeses are made. The hilly country, just noticed, on the northern side of Lombardy, is less productive, and cultivated on a more limited scale. The valleys, however, intervening among these hills are of great fertility, yield a considerable quantity of grain, and much wine from the numerous vineyards to which they give shelter.

The district which appears to have suffered most from the ravages of the pellagra, is that which formerly constituted the duchy of Milan, and particularly the Alta Milanese, or that portion of country lying up towards the hills between the Lago Maggiore and the Lago di Como. It was in this part of Lombardy that the disease first became an object of medical attention; and some time elapsed before it was described as appearing in the Venetian provinces, and near the shores of the Adriatic sea. (Medico-Chirurg. Transactions, vol. viii. p. 320.)

The propagation of pellagra has by some been referred to contagion; facts and authority, however, preponderate greatly against this opinion. Its hereditary tendency is proved by its frequent appearance at the earliest period of life, as attested by Dr. Sacco, of Milan, who, in the capacity of Director of the Vaccine Establishment, has had the best opportunities of observation. It has, moreover, been generally remarked that the disease is continued in succession through families. Conflicting accounts are given of the sex in which it most prevails, but there is ample reason to conclude that the discrepancy has arisen from the occupations of the men and women in different districts being reversed, and not from any physical peculiarities in the conformation of either.

In reference to the remote causes, the most important facts in evidence undoubtedly are, the limited period during which the disease appears

to have existed in the country, its being confined almost exclusively to the lower classes, and its rare appearance in the towns or cities of Lombardy. The climate is obviously not the cause concerned; since this, as far as it is known, has been unchanged for a much longer period than that which includes the history of pellagra; or had it been changed, it would have affected alike both the higher and lower classes of the population. The same objection may be made to the opinion that any circumstances of mere locality are concerned in producing the disease. It may possibly be true that the plains of Lombardy are more frequently and irregularly flooded than formerly, and that the general surface is more marshy and unwholesome; but this does little to explain the causes of a disorder which is chiefly prevalent in the higher lands, where such changes have not equally taken place.

The point, then, to which we are almost necessarily conducted, is the mode of life and subsistence among the peasantry: this, it appears, is as wretched as the soil is productive; an evil which has been progressively increasing for more than the last half century, and is probably the result of devastation from repeated wars, political changes, and the consequent heavy taxes and imposts, combined with a decaying commerce and bad arrangement between the landlords and cultivators of the soil.

The ordinary diet of these people consists chiefly of maize prepared in different ways, of rice, millet, beans, and some other articles of vegetable food. Their bread, which is principally made from maize, is for the most part of bad quality, ill fermented, and not unfrequently deficient in salt. Animal food rarely forms a part of their diet; and though living on a soil which produces wine, their poverty almost precludes the use of it, even when sickness and debility render it most needful. The same condition of poverty is evident in their clothing, in their habitations, and in the want of all the minor necessaries and comforts of life. By several of the Italian physicians, the common use of maize has been considered a specific cause of this peculiar disorder. Dr. Holland controverts this opinion by the results of his personal observation with regard to the peasantry in the northern parts of Greece, who, though subsisting chiefly on the same kind of grain, are wholly free from the disease, as is also observed in the south-western parts of Europe, where the same diet is as generally in use among the lower classes; and, with the exception of a disease occurring in the Asturias, (the elephantiasis Asturiensis of Mason Good), Dr. Holland further states that he does not know of its existence in Spain or Portugal, where the maize is very extensively used. Rice has also been supposed to be specifically productive of the disease, but it must be acknowledged that facts by no means warrant the supposition. One circumstance which seems to deserve a prominent place in the consideration of this part of the subject is, the first appearance of the symptoms in the spring of the year, their partial disappearance in the autumn, their renewal in the ensuing spring, and the continuance of this alteration for successive years, whenever the disease is protracted thus long without reaching its latter stages. This chain of phenomena has led Albera, Frapolli, and other Italian writers, to refer the origin of the disease to the frequent exposure of various parts of the body to the action of the sun's heat, which, it seems probable, is an exciting cause of the cutaneous and some other of the symptoms; but that it is not the fons et origo mali is proved by the circumstance of the peasantry of other parts of Italy and of tropical countries being subjected to more intense exposure of the same kind without corresponding results. That such insolation, moreover, is not the only exciting cause, has been proved by the fact adduced by Strambi, that the cutaneous eruption may be prevented by avoiding exposure to the sun, whilst the other symptoms proceed in their usual course. There is also reason to expect that the incipient stage of the disease would, if induced by this cause, be common when the sun's heat was most intense, a circumstance contrary to common observation; and it may be presumed, as suggested by Dr. Holland, that the increased labours of the peasantry in the early part of the spring, being speedily followed by the development of the symptoms, must have some influence on their production at this particular period. Perhaps, also, adds the same observer, the periodical returns of the pellagra, during its early stages, depend in part on the natural periodical changes of the body itself, independently of the external causes just alluded to.

It must be acknowledged that the chain of connection between the causes of pellagra and its specific symptoms has not hitherto been distinctly traced; but we know from universal experience that identity of disease has a common origin in a prevailing insufficiency of food, or in the use of such as is depraved or innutritious in its quality: we know, moreover, that the combined evils, already detailed, in the moral and physical condition of the people who become subjects of pellagra, have at all times been observed in connection with the prevalence of analogous disorders, which have been variously described under the comprehensive name of leprosy. It is further evident that the end of the several processes subservient to alimentation demands a sufficient and suitable supply of aliment; and in defect of either, the immediate wants of the system, as well as the imperfect actions of the various organs, become evident by the train of phenomena constituting the symptoms of disease. Added to and aggravating these in pellagra, we have the direct action of an irritant (the sun's heat), which, besides the local effect, and its direct consequences upon the nervous system, must, by impeding the important function of the cutaneous secernents, reflect their uncliminated material through the medium of the circulation over the whole body, and thereby help to generate its universal disorder. When we further consider the diversity of modifying influences, the mutability of their nature, and their relative operation, we cannot be surprised at the diversified appearances, nor at the endless discussions on the identity of diseases of this nature, arising no doubt from the unwarrantable habit of endeavouring always to limit to the arbitrary signification of a name circumstances confessedly Proteian in their nature, and which have a very distant analogy to the distinct and circumscribed

characters proper to objects of natural science, the classifications of which have been the models of nosological imitation.

The treatment of pellagra, like that of other endemic diseases which have their origin in the privation of the necessaries and comforts of life, has been infinitely diversified, and, according to general acknowledgment, unsuccessful. The patients on their admission into the hospital (we quote Dr. Holland) are immediately allowed a nutritious diet, and, unless contra-indicated by some local affection, wine and tonic medicines are given with the same view. A decoction of the lichen Islandicus is in common use in the hospital of Milan, as a part of this plan of dict. The warm bath is very generally employed at the same time; a favourite remedy among the peasantry, probably in consequence of its comparative cheapness, but esteemed also by most of the medical practitioners who are concerned in treating the disease. Diaphoretics, and especially antimonials, are in considerable use, under the idea of correcting the state of the skin, and getting rid of the morbid humours through this channel. Depletion by bloodletting is very rarely employed except where some local inflammation happens to occur, or in the mania which sometimes supervenes upon the disease. Attention is of course paid to the bowels in correcting the diarrhœa, and bringing them as far as possible to a natural state.

Besides these means, a long list of medicines, commonly termed antiscorbutics, are in popular use; but having mentioned the various preparations of cinchona, sarsaparilla, guaiacum, sassafras, cantharides, terebinthina, and mercurials, it would be superfluous to enumerate the thousand remedies for this hitherto untractable and fatal disease.

From the preceding detail it is evident that the labour of physicians in the treatment of pellagra must continue in its results to resemble that of Sisyphus, until a decided amelioration can be effected in the moral and physical condition of that unfortunate class of persons in whom it is found to occur; and all former experience of diseases analogous in their nature justifies us in asserting that when, and not till when, it ceases to be the opprobrium patriæ, will it cease also to appear to be the opprobrium medicorum.

[The following are the conclusions drawn by M. Brière de Boismont, from a careful study of the disease in the districts where it reigned epidemically:

First, pellagra is, at times, a primary irritation of the digestive organs, complicated with irritation of the nervous and cutaneous systems; at others, it is a disease of innervation, with secondary lesion of the digestive functions. In many cases, the nervous system alone is attacked. The affection of the skin, which is sometimes wanting, and not always in a ratio, as regards intensity, with the other symptoms, and which may even disappear without the disease being cured, is evidently consecutive in all cases without exception. *Secondly*, the symptoms, causes and lesions, leave not the slightest doubt as to the inflammatory nature of the disease, and its true seat. *Thirdly*, the exciting causes of pellagra belong to the class of irritants and debilitants. *Fourthly*, the pathological alterations found in the digestive, cerebro-spinal, and external tegumentary systems, are the products of inflammation. *Fifthly*, the three stages are not always as distinctly defined as has been pretended; the second, which is almost constantly mortal, if the circumstances are not changed, may remain stationary for many years. The third is incurable. *Sixthly*, removal from the locality, and change of life, exert a happy influence on the disease, which is not contagious, but is hereditary, and has a constant tendency to extend. *Seventhly*, the antiphlogistic treatment appears to be most successful; but to arrest the progress of the scourge, it is indispensable to have recourse to proper hygienic and administrative measures.]

WILLIAM KERR.

PEMPHIGUS, from *πέμφιξ*, *a bleb*, or *blister*. This disease belongs to the order *Bullæ* of cutaneous diseases. Under the present heading we shall include both pemphigus and pompholyx, as we consider the latter as merely a variety of the former.

Previously to the time of Willan, nosologists made a distinction between these diseases, describing pemphigus as an idiopathic cruptive fever (*febris pemphigodes*), running through a certain fixed course like measles or scarlatina, and pompholyx as differing from it, in not being accompanied by fever; and this view is still supported by some writers on skin diseases. An additional line of demarcation was supposed to be found in the local characters of the eruptions; pemphigus being supposed to present bullæ with inflamed edges, and pompholyx to consist of bullæ without inflammation or redness around them. These distinctions will not bear examination. The fever which sometimes precedes or accompanies the bullæ of pemphigus, makes no approach to the regularity of the fevers of measles or scarlatina, but is, on the contrary, very irregular in its nature and duration. It may be a short inflammatory fever, or of a low typhoid type, or it may assume the characters of an intermittent. The period of the fever at which the eruption of bullæ appears, is equally uncertain. The bullæ may appear almost simultaneously with the accession of febrile symptoms, or on the second day of fever, as in the case related by Seliger, and referred to by Dr. Willan; or on the second accession of an attack of intermittent fever, as in the case related by Dr. Winterbottom; or on the fourth day of low typhoid fever, as in the case related by Dr. Dickson in the first volume of the Transactions of the Royal Irish Academy. The bullæ may be still more irregular in their eruption, coming out in successive crops at uncertain periods of a continued fever, and, lastly, may appear either as sympathetic with or as a crisis of internal visceral disease. These irregularities of the type of the fever, and of the coming out of the eruption, are sufficient to convince us that pemphigus has no claim to the title of an idiopathic eruptive fever. The further supposed distinction between it and pompholyx, of the bullæ of pemphigus having a red inflamed edge, and those of pompholyx not possessing this character, will prove equally invalid; for this character is merely accidental.

The bullæ will possess or will be deficient in this character, according to the time at which they are examined. In almost every instance a distinct circular erythematous patch upon the skin precedes the formation of each bulla. If the bullæ be examined before having attained a sufficient size to occupy the entire of the erythematous patch, there will then be seen around the circumference a red inflamed edge formed by the outer margin of the erythematous patch not yet occupied by the bullæ; but if not examined until a later period, or if even examined at a very early period, when (as in pemphigus solitarius) the growth of the bulla is very rapid, then the entire of the precursive erythematous patch will be covered by the bulla, and there will be no surrounding blush or tumefaction; or, in other words, the disease will be the pompholyx of some authors. These are our reasons for considering pompholyx as merely a variety of pemphigus.

Pemphigus may be defined "an affection of the skin, consisting of the eruption of one or more bullæ containing serous fluid, and terminating either in thin scales, in superficial excoriations, or in ulceration."

The immediate pathology of pemphigus is an effusion of serous fluid from the surface of the rete mucosum, which first detaches portions of the cuticle, and then distends them into bullæ. In most instances there are erythematous patches upon the skin preceding the appearance of the bullæ. Between these the skin preserves its natural appearance, or seems very slightly swollen. If the finger be passed over the surface, each erythematous patch gives a sensation, arising from the local congestion, of being a little firmer and more elevated than the surrounding surface; but there is no marked increase of thickness or hardness of cutaneous or cellular tissue, such as is found in the commencement of pustular diseases. The bullæ first appear on the centres of the erythematous patches; and around each bulla there may or may not be a red margin according as the bulla occupies only the central portion, or has spread over the whole of the inflamed base from which it has arisen. The skin between the bullæ continues to preserve its natural appearance and colour. The bullæ always commence as such, and never as papulæ or pustulæ; in the commencement they are translucid, either colourless or of a pale fawn or slightly bluish cast; and as they continue to grow, they assume a hemispherical shape, and present different sizes from that of a split pea to a size sufficient to contain a teacupful of fluid. The fluid contained in the bullæ consists principally of albumen; it readily coagulates by heat into an almost solid mass, and sometimes, although rarely, the albumen of a bulla is in such quantity as to coagulate spontaneously and form a layer lining the distended cuticle. The fluid of the bullæ is usually bland and devoid of smell, but, in some varieties of the disease to be afterwards noted, gives out a most disagreeable fetor, and seems to acquire acrid properties. When the bullæ are fully formed they become opaque, and sometimes, from a trifling admixture of purulent matter, present a yellowish, or greenish yellow shade. Arrived at this stage, they may terminate in various ways. In mild cases the smaller sized bullæ, after having reached their greatest degree of development and tension, begin to wither; the cuticle wrinkles; and the albuminous portion of the effused fluid, together with the detached cuticle, dries into a thin brownish scab, which, falling off, exposes a red patch formed of the inflamed true skin, with its thin new cuticle. The larger sized bullæ burst either spontaneously or through accident; and the broken cuticle, lying flat upon the inflamed surface, now dries away into a scale, which separating, exposes, as before, the red base on which the bulla arose. For a short time after the larger bullæ are opened, the inflamed excoriated surface continues to secrete a fluid similar to that originally effused. In weakly constitutions, after the bullæ have burst, the inflamed surface of the true skin, instead of furnishing a new cuticle, takes on the action of secreting pus; and if the pus or scab formed of it be removed, then presents the appearance of an indolent ulcer. In more severe forms of the disease, the fluid of the bullæ is thin and ichorous, forms no crust, and when discharged by the bursting of the cuticle, exposes an unhealthy-looking flabby ulcer; the tissue around softens, and the ulcer continues to spread as a gangrenous ulcer, engaging in its destructive progress all the surrounding tissues without distinction.

No portion of the cutaneous surface is exempt from the invasion of pemphigus. It may confine itself to a part, or may spread itself over the entire surface; but the parts on which the eruption most frequently appears are the limbs, particularly the lower limbs, and the skin of the abdomen. The bullæ also make their appearance on the mucous membrane of the mouth and of the vagina. One variety of the disease (pemphigus gangrenosus) has a tendency to attack in preference the skin behind the ears and the folds of the thighs.

Pemphigus may make its appearance as an idiopathic disease, or as sympathetic of some internal visceral irritation; or its bullæ may occur during the course of other diseases, more especially those of the skin, principally erysipelas, herpes, prurigo, scabies, and varicella. It is asserted by some writers that the bullæ of pemphigus are occasionally found on the mucous membrane of the stomach and intestines. Rayer admits the occasional existence of bullæ on the mucous membrane of the mouth, but denies their existence in the stomach and intestines. Of their occasional existence in the mouth there cannot be a doubt. In the case related by Dr. Dickson, and already referred to, the patient, a delicate woman, twenty-three years old, felt on the third day of low fever a tingling pain and smarting in the tongue and inside of the mouth. On the next, the fourth day, a pellucid bulla appeared on the tongue one inch long, and half an inch broad, turgid, with faintly yellowish serous fluid, and a smaller one on the inside of the left cheek. The sensation felt was as if these bullæ were full of scalding water. On the fifth day, bullæ appeared over the body; and on the ninth day the bullæ of the mouth left behind them an excoriated and acutely sensible surface.

In the abdominal viscera the changes observed most frequently in fatal cases of pemphigus are redness, softening, and ulcerations, the ordinary

effects of gastro-enteritis. Biett states that the internal derangement which he has observed most constant in pemphigus is the fat liver.

Diagnosis.—Vesicles, or bullæ, are sometimes found in erysipelas which bear a close resemblance to pemphigus; but they are at once distinguished by the whole surface of the skin on which the vesications appear in erysipelas being tense, shining and red. The vesicles of herpes somewhat resemble the bullæ of pemphigus; but exclusively of being much smaller and irregular in form, they are always clustered upon a red inflamed surface; while the bullæ of pemphigus are scattered, the skin between them preserving its natural appearance. The extremely small size and immense numbers of the vesicles of miliary eruption furnish us with a well-marked line of distinction between it and pemphigus. Varicella, or chicken-pox, when fully developed, presents vesicles, which, however, are easily distinguished from the bullæ of pemphigus by being pretty equally diffused over the entire body, and by all being of nearly one size, and much smaller than the bullæ of pemphigus.

Rupia has some characters in common with pemphigus, and belongs to the same order; but in rupia the bullæ are generally fewer in number, smaller, less tense, and more flattened than in pemphigus, and the contained fluid quickly becomes sanious or purulent. The cutaneous tissue around the bullæ of rupia is more deeply inflamed; and the bullæ, after having reached their full growth, instead of forming thin crusts or excoriations as in pemphigus, are followed by thick prominent scales, which, when removed, expose deeply-eaten ulcerations.

These are the only diseases which can be confounded with pemphigus. The characters distinguishing pemphigus from all other affections of the skin are so marked, that it is quite unnecessary to point them out.

Prognosis.—It may be laid down as a general rule that the more acutely pemphigus sets in, the less dangerous it is; and as it shows a tendency to become chronic or occur in weakly constitutions, or is accompanied by a fever of a low typhoid type, the more unfavourable is its prognosis.

Causes.—Whatever acts directly as a stimulant to the skin, or indirectly injures its function through the medium of the constitution, or of the mucous tissue of the digestive organs, may be an exciting cause of this disease, viz. exposure to the direct and burning rays of the sun, or the application of any irritating substances. Among mowers in Ireland, a local form of pemphigus attacks the skin over the ancles, and is a very troublesome complaint. It is by the men themselves attributed to the seeds of the cow parsnip (*heracleum sphondilium*). The bites of some serpents, the prolonged impression of cold or damp upon the surface previously over-heated, excess in the use of spirituous liquors or heating spices, depression of mind, marsh residence, debility however induced, are also in the list of exciting or of predisposing causes. The disease has supervened on the suppression of the lochia, of the menstrual discharge, of hemorrhoids, and of diarrhœa.

The bullæ of pemphigus occasionally accompany epidemic diseases, such as scarlatina; and from this complication has arisen the description of pemphigus Helveticus as an epidemic given by Laughans. There is, however, no authentic description of simple pemphigus prevailing as an epidemic.

Pemphigus is a disease of all climates and seasons; but one variety, pemphigus gangrenosus, is generally confined to certain districts as an epidemic disease: we shall have occasion to speak more at large on this form of it. Cullen, in his "Synopsis," characterizes pemphigus as a contagious disease; but at the same time observes that he has only followed Sauvages, and that he has no knowledge of the disease from personal observation. Experiment is unfavourable to the supposition of the disease being contagious. Husson inoculated five children with fluid taken from the bullæ of pemphigus, and the disease was not in any instance transmitted. (Recherches Historiques et Médicales sur la Vaccine.) Martin confirmed these by similar experiments. (Journal de Médecine, Chirurgie, et Pharmacie, vol. ii. p. 225.)

The varieties of pemphigus may be considered with most practical advantage under the heads of *acute pemphigus*, *chronic pemphigus*, and *gangrenous pemphigus*.

1. *Acute Pemphigus.*—This variety is preceded by febrile symptoms of very uncertain characters. There is generally a premonitory shivering fit very well marked, and in some cases there are two or more shivering fits so distinct, that the attack at first sight appears to be intermittent fever. In other cases, after a fit of shivering, there are the symptoms of continued fever—thirst, loss of appetite, coated tongue, and dry hot skin; and after these have continued usually from one to four days, the surface about to become the seat of the eruption, generally the skin of the abdomen and lower extremities, in a few cases of the whole body, is affected by a sensation of tingling heat, and circular red patches of various sizes come out, irregularly scattered over the surface; their colour will not disappear under pressure, and within twenty-four hours of their appearance bullæ arise on these patches and rapidly increase, until each bulla occupies the entire or nearly the entire of the inflamed plane on which it has arisen. Some of the bullæ, although rarely, become confluent. The bullæ having arrived at their full size, usually within the period of two or three days from their first appearance, become turgid, burst, and discharge their contents, leaving the surface of the true skin now exposed, red, excoriated, and painful. The pain is like the sensation produced by a burn or scald, and is not felt until the true skin is exposed by the bursting of the bullæ. The exposed cutis is, however, soon covered by a thin crust formed by the old cuticle, the remnant of the contained fluid, and a secretion of similar fluid, which continues for a short time from the inflamed surface. The thin scab thus formed, after a few days drops off, and exhibits the true skin covered with a new cuticle, and of a dark red colour. This colour remains for an uncertain time. The febrile symptoms which ushered in the disease usually abate on the appearance of the eruption, and continue in a mild degree until the healing of the broken bullæ. In a very great majority of

cases the termination of the attack is a marked crisis, either by diarrhœa or a copious deposition from the urine.

The duration of acute pemphigus is very uncertain. It never runs its course in less than a week, and is seldom prolonged beyond a month. When gastro-intestinal irritation is superadded, the symptoms are aggravated, and in such cases the mucous membrane of the mouth may present bullæ resembling those upon the surface, but, from being constantly bathed in moisture, not forming scales. There is a form of acute pemphigus, in which, after heat, itching, and redness of a part, a single bulla arises, (pompholyx solitarius of Bateman,) and after becoming enlarged to a size sufficient to hold a tea-cupful of fluid, bursts, and is, perhaps, succeeded by another following the same course. In this variety, if a bulla burst before it has attained its full size, it may heal in the centre, and the circumference of the bulla continuing to increase, will produce the appearance of the whole cuticle of the part peeling off.

Treatment. — The treatment of acute pemphigus, when it exists as an idiopathic affection, is very simple; the febrile symptoms not generally running so high as to demand very active treatment. Mild purgative and diuretic medicine and cool drinks are generally all that are required. If the disease be complicated by gastro-intestinal irritation or inflammation, or be sympathetic with the disease of any important internal organ, the cutaneous affection becomes of secondary importance; the internal disease demands all our care. Warm baths, or any heating application to the skin, are improper in acute pemphigus. It is recommended in some works to open the bullæ as soon as they are formed. This is not judicious practice. The distress of the patient is comparatively little before the bullæ have burst; but after this there is, as we have already noticed, a most painful sensation of burning, produced by the exposure of the raw surface of the true skin. The febrile excitement is thus increased, and we shall both hurry and prolong the pain and fever if we unnecessarily puncture the bullæ. We can apply to the excoriated surface no dressing so mild as its own albuminous secretion, and can protect the excoriated skin from the irritation of exposure by no covering so effectually as by its own cuticle. When the bullæ have burst, either spontaneously or by accident, and the excoriated surface is scalding and painful, the denuded part should be covered with the mildest dressing, with slips of gold-beater's leaf, or the delicate membrane which lines the interior of an egg-shell. When the bullæ are withering, and cicatrization is taking place, and after the fever has subsided, it becomes necessary to support the strength of the system, and aid it in its curative efforts by the exhibition of tonics, of which the best is cinchona or sulphate of quinine. Sometimes the fever which ushers in acute pemphigus presents almost from its very onset a low typhoid type; and while intestinal irritation is allayed by the mildest purgatives, the patient's strength requires to be supported by light broths, and, according to the symptoms, by wine and bark.

2. *Chronic Pemphigus.* — This variety of the disease is generally met with in old persons or in debilitated constitutions, is sometimes idiopathic, but more often sympathetic, with internal visceral disease; in the latter, of course, the more serious. It is the *pompholyx diutinus* of Bateman, *dartre phlycténoide confluente* of Alibert. This is a very obstinate and distressing form of skin disease, and there is scarcely any limit to its duration. After premonitory symptoms of lassitude, headach, &c., bullæ appear on different parts of the body. These heal, and are succeeded by others, which, as the patient's strength becomes weaker, show a disposition to ulcerate. There is intolerable pain and burning, from the exposure of the denuded cutis, and irritative fever sets in. A crisis may now take place, either by diarrhœa or by a copious deposition from the urine; the bullæ dry up and heal, the symptoms of irritative fever disappear, and the patient believes there is a perfect cure; but after a short interval the disease again shows itself. There is less disposition in the bullæ of each successive eruption to heal; the constitutional irritation produced by the numerous excoriated surfaces prevents rest, destroys appetite, and finally wears out the patient by exhaustion; or the constant irritation aggravates to such a degree some internal lesion, otherwise of little consequence, that a new train of symptoms sets in, the pemphigus disappears before some more formidable affection, and the patient dies of internal visceral disease. The bullæ of chronic are always larger than those of acute pemphigus, and, as already observed, are more generally sympathetic with some internal disease of function or of structure than an idiopathic affection of the skin. Persons advanced in life are more subject to chronic pemphigus, and whatever debilitates the constitution, as mental depression, or bad or insufficient food, or injures the functions of the skin, as a residence in cold damp situations, may tend to bring forth the disease; and in cases where the previous debility has been very great, the bullæ not only ulcerate, but the surface on which they have arisen sloughs around the bullæ to a considerable extent.

Treatment.—As this disease is so frequently a symptomatic affection, the treatment is in general complex, and must in such circumstances be directed as much to internal visceral disease as to the external skin affection. For the treatment of the rheumatic, gouty, or visceral derangements which may be combined with chronic pemphigus, we of course refer our reader to the various heads under which those derangements are considered. Internal irritation (if any) being allayed by appropriate means, the patient who is the subject of chronic pemphigus is then to be put upon a full and nourishing but not stimulating diet, and tonics combined with diuretics, as sulphate of quinine with compound infusion of juniper, or bitters with alkalies, are to be administered. Locality has often much influence over this disease, and hence, if the ordinary measures above recommended are not successful, change of air should be enjoined, and the change should always be to a dry air and a high situation. The bullæ should not be opened by art, for the same reasons as given for not opening the bullæ of acute pemphigus. If the bullæ burst and leave indolent ulcerations, these are to be stimulated with powdered bark or burnt alum,

or touched, if necessary with solid nitrate of silver. Warm baths generally aggravate this disease when present, but are very useful as preventives by preserving the skin in the exercise of its healthy functions.

Before we proceed to the third variety, gangrenous pemphigus, it is necessary to mention a form of pemphigus which does not perhaps strictly come under any of the heads we have named. For practical utility we have described two forms of pemphigus, as acute and chronic; but here, as in most diseases, this line of distinction is more arbitrary than real, the two forms running into one another by imperceptible gradations: perhaps the term subacute, borrowed from the French, would be the best name for the variety of pemphigus to which we now allude, and which forms the connecting link between the acute and chronic forms. This variety of pemphigus corresponds with acute pemphigus in being accompanied with fever, but agrees with chronic pemphigus in presenting, not simultaneous, but successive eruptions of bullæ. It is called by French writers "pemphigus aigu successif." The accessions of febrile symptoms are irregular, and with each accession a new crop of bullæ appears on the skin, the whole attack usually running its course within a few weeks. The treatment is merely a modification of that recommended for acute pemphigus, with this addition, that as the fever which precedes the eruption takes on an intermittent form, the early exhibition of bark is called for.

3. *Gangrenous (or infantile) Pemphigus.*—(Pemphigus infantilis of Willan, rupia escharotica of Bateman and Biett.) Bateman and Biett place this disease under the head *rupia*, but improperly, for the fluid of the bullæ in this disease is a thin sanious ichor, neither forming thick crusts, nor turning purulent, which are the distinguishing characters of rupia. This form of pemphigus is exclusively confined to children, and very rarely attacks them after the age of five years. In many parts of Ireland this singular disease prevails to a great extent, principally among the children of the poor, and appears to be in some situations an endemic disease, but from time to time breaking out as an epidemic, attended with great mortality. This latter circumstance has probably originated the belief in the contagious nature of the disease, very generally entertained by the people of the districts where the disease is prevalent. There are, however, no satisfactory proofs in support of this opinion. Dr. Macbride, in his "Methodical Introduction to the Theory and Practice of Medicine," notices an outbreak of this disease. "In the county of Wicklow, about twenty miles from Dublin, a disease of this kind (as the author has been informed) appeared in the year 1766, but attacked only children, many of whom were carried off, until the cortex was thought of as a remedy, and found equally efficacious as in the malignant sore throat." It is singular that in the same county the disease is still prevalent. It is known in different parts of Ireland under the various popular names of "white blisters," "burnt holes," "eating hive," &c. No systematic work on diseases of the skin contains either full or accurate information on this singular form of pemphigus. To Dr. Whitley Stokes we are indebted for our knowledge of its symptoms and treatment, and we cannot give that information in better words than his own.

"The approach of this disorder is sometimes, though rarely, denoted by a livid suffusion like that of erysipelas slightly elevated. This was both observed by Dr. M'Donnel of Belfast, and by Dr. Spear, in the county of Monaghan, at a time when the disease prevails there epidemically. It more frequently happens, however, that the complaint comes on in perfect health. One or more vesicles appear, mostly larger than the best distinct small-pox; these increase for two or three days, burst and discharge a thin fluid having a disagreeable smell, limpid in most cases, sometimes whitish, and sometimes yellowish, the latter less dangerous; usually the weaker the child's constitution is, the thinner is the matter. Before or after breaking, the vesicles run together, the sores become painful, with loss of substance and a thin fetid ichorous discharge; the edges of the ulcer are undermined, and it spreads quickly. The more usual seats of the disease are behind the ears, sometimes on the hands or feet, on the private parts, (seldom on the arm-pit), the breasts, folds of the thighs, lower belly, on the inside of the mouth or lips. The disease, however, it is said, seldom passes from the inside to the outside of the mouth. In the progress of the disorder, the ulcers enlarge rapidly, with remarkable fetor, very great discharge, and livid edges. If the sores are behind the ears, they destroy the connection of the posterior cartilage with the cranium; they spread to the meatus auditorius; to the eyes, the sight of which seemed in a few cases to have been destroyed one or two days before death; and they sometimes extend to the vertex. The constitutional disturbance that accompanies this disease seems principally the effect of irritation. When the vesicles burst, the child begins to grow peevish and fretful, pale, loses its appetite, and the flesh becomes remarkably flabby. The periods of this disorder are not very regular; but it often happens about the eighth day that the pulse sinks, the lividity spreads over the whole sore, the fetor and discharge increase greatly. The smell is so strong as often to be perceivable at a distance from the bed. The discharge in one case where the ulcers affected the arm-pits and breasts, was such that the linen was completely loaded several times a day. Death takes place about the tenth or twelfth day, often preceded by convulsions, sometimes by extreme debility. Patients are apt to relapse soon after the sores are skinned over. The causes of this malady are rather obscure. It seems exclusively confined to children. Dr. M'Donnel saw twenty cases before the year 1795; all the patients were under four years old. Dr. Spear observed that it was confined to children from the age of three months to that of five years; but it has been observed near Dublin in children of nine years old. It attacks the finest children in preference; the children of the poor more frequently than those of the affluent; and those who live in damp situations seem more peculiarly subject to it than others. The disease is more prevalent in summer than in winter. It appears to be infectious, though obscurely so in general; but in the year 1800, Dr. Spear observed it to spread epi

demically. It has been said that the disease oftener affects the younger from the older than the reverse. It would be interesting to determine whether it attacks the same person twice; it certainly is apt to return after apparent recovery. Children, as is well known, are subject to excoriations behind the ears which sometimes produce formidable sores; these may, possibly, in a few cases, resemble the discase we speak of, in its advanced stages; but in a great majority of these cases these excoriations are far less rapid and dangerous than the complaint in question. On the other hand, the swine-pock (varicella) resembles this discase in its first stage; but the fever rarely precedes the eruption in white blisters, and pustules of varicella dry readily.

"This is a disorder of great danger, but of various progress in different individuals. It often happens that a fatal change takes place about the eleventh day. The unfavourable signs are, the rapidity with which the sores spread; the blackness, first at the edges, after some time spreading over the whole; the quantity and fetor of the discharge; its colour, the paler being the most dangerous.

"It has been alleged by empirical practitioners in this discase, that after the blackness had covered the whole sore, death was certain; but I have observed the blackness to go off, although it had spread over the whole surface of the sores. When this appearance abates, livid streaks generally remain for a day or two. When a favourable change is effected in bad cases, the diminution of the fetor and discharge were the first signs of the abatement of the malady; appetite was afterwards restored."*

Dr. M'Adam, in a paper on this disease in the same journal, (vol. i. p. 307,) states that the discharge from the vesicles is acrid, and that he has seen erosions produced on the breast by fluid which fell accidentally from the vesicles. This disease was very fatal and very unmanageable in all its stages. Dr. Willan says, speaking of pemphigus infantilis, that treatment was attended with little success. All ordinary modes of treating the disease having failed, Dr. Stokes was led to search after a traditionary empirical cure, of which he had heard a favourable report. He carefully watched over some cases treated by a person who professed to possess the secret of curing the disease, and having satisfied himself that the treatment was successful, he made himself acquainted with its details. The principal application was a compound green ointment composed of a great number of herbs, some active and some inert. From one plant "scrofularia nodosa" (*great fig-wort*) occurring in several receipts which Dr. Stokes procured, he was led to fix upon a simpler ointment made from this plant alone; the following are his directions for treatment. "When the parts adjoining the sores are swelled, and strongly suffused with a dusky redness, or if the sores have been previously dressed by any dry powder, I apply a poultice of porter and oatmeal. The carrot poultice in fermentation, if it can be procured without any delay, would perhaps be useful. After about eight hours the poultice should be removed, and the parts affected very gently wiped with a roll of lint or soft rag; then the scrophularia ointment should be applied. It should be as highly saturated with green vegetable matter as possible. For this purpose the plant should be taken fresh, the smaller leaves selected, and stewed a considerable time with as small a quantity of unsalted butter as will be sufficient to prevent the leaves from being scorched. If well prepared, it is of a full grass-green colour; but after keeping it becomes the colour of box leaves, especially at the surface; yet I apprehend it preserves its efficacy, in a great degree, for many months. When applied, it should be melted and suffered to cool to the consistence of honey; it should be applied by a soft feather, with the utmost gentleness, to the whole surface of the sore. Through the whole of the treatment, the greatest gentleness should be used. If the ear is strongly drawn open, the parts affected are made to bleed, which produces many inconveniences, and retards the progress of the cure. After smearing the ulcer with the ointment, it should be dressed with the same ointment, with the addition of one-eighth part of wax. The last ointment should be spread on lint folded to the dry side, and cut so as to fit behind the ear; the whole should be secured by a broad bandage, drawn under the chin, and fastened over the top of the head. This dressing, in very severe cases, should be repeated every fourth or sixth hour; but as the fetor abates, larger intervals may be allowed. I do not pretend that this treatment will always succeed; but perhaps, of four such cases as may occur to any practitioner, not excluding the most hopeless, it will succeed in three on an average: and if we could accurately ascertain the mortality which takes place when other methods are used, we should consider this proportion of success as very satisfactory." This ointment is now introduced into the Dublin Pharmacopœia, and is found a most useful application, not alone in the disease here noticed, but in many other affections of the skin and scalp. Dr. M'Adam, in the paper already alluded to, speaks favourably of the internal exhibition of cinchona in this disease, and of the external application of strong ung. hydrargyri nitratis.

D. J. Corrigan.

* Dublin Medical and Physical Essays, vol. i. p. 146, 1807. On an Eruptive Disease of Children, by Whitley Stokes, M. D. S. F. T. C. D., Professor of the Practice of Medicine.

PERCUSSION. See Auscultation, and Chest, Exploration of the.

PERFORATION OF THE HOLLOW VISCERA.—This term is generally employed to designate a solution of continuity, in consequence of disease of the walls of a hollow organ. The term *spontaneous perforation* has likewise been applied to those perforations which occur without having been preceded by any perceptible modification of function, local or general.

Perforation is far from being a rare occurrence in several organs of the body, and has been observed to take place under various circumstances in most of them. The relative order of its frequency may be stated as follows: the organs of respiration; digestive organs; organs of generation in the female; vascular system; urinary organs; hollow bones; the eye and the ear.

Perforation of the parietes of the three great cavities is occasionally observed, and perhaps more frequently in those of the abdomen and head than in those of the chest.

When perforation takes place in any of these parts, a preternatural communication is established between two or more natural cavities; between these and an accidental cavity formed in consequence of ulceration, mortification, or the accumulation of pus, blood, or other fluids in the solid viscera; and between one or both of these and the external surface of the body. Hence it follows that perforation may give rise to the effusions of a natural or accidental fluid into a serous or mucous cavity, or on the external surface of the body, and which, consequently, may be either retained or rejected.

Perforation may, however, occur without a communication being established between the perforated organ and a natural or accidental cavity. This is accomplished in two ways; 1st, by the union of a neighbouring organ with that which is perforated previous to the occurrence of this lesion; 2dly, by the formation of a false membrane between which and the surface of the perforated organ an organic union had previously been established.

Examples of these two modes in which a preternatural communication from perforation is prevented from taking place between two or more hollow organs, or between these and accidental cavities, are often met with in the abdominal and thoracic viscera. One, two, or more portions of the small intestine are found more or less firmly united over ulcerations of greater or less extent which occupy in depth the whole of the coats of these portions of intestine. A portion of the epiploon has been found adhering to the surface of the intestine or gall-bladder, and covering perforations of these organs; and the liver, spleen, pancreas, mesentery, transverse arch of the colon, and diaphragm, furnish striking examples of the means which nature employs to supply the loss of substance occasioned by several diseases, of all the coats of the stomach, and to prevent a communication from taking place between the cavity of this organ and that of the abdomen and thorax. Similar examples are met with in the lungs when these organs are the seat of tubercular excavations. The walls of these excavations, particularly when they occupy the upper lobes of the lungs, are often found to be formed in great part by those of the chest, the pleura pulmonalis and costalis over the excavation being intimately united by immediate contact, or by means of dense cellular or *cellulo-fibrous* tissue.

The second mode of prevention of a preternatural communication from perforation, viz. the formation of a cellular or serous membrane, is much less common than the former. The presence of this accidental serous or cellular membrane may be confined to that portion only of the walls of the organ in which the perforation exists, or it may extend over the greater part or even the whole of the serous surface of the affected organ. It is almost always of a limited extent on the peritoneum when it forms a barrier to the escape of the contents of the intestines into the cavity of the abdomen, and more or less extensive on the pleura when it accomplishes a similar purpose, namely, when it prevents air, pus, or other fluids contained in the lungs, from passing into the cavity of the chest.

Perforation has been found to occur in consequence of ulceration, mortification, inflammatory softening, and chemical dissolution. Among these organic lesions, those which give rise most frequently to perforation are ulceration and mortification, because of these diseases occurring in almost every organ of the body. Inflammatory softening and chemical dissolution being, on the contrary, met with only in certain organs, are much less frequently the causes of perforation.

We shall now take a general view of perforation as it occurs in the different organs of the body in consequence of one or more of the lesions we have named, and shall confine ourselves to the description of its anatomical characters, and such other circumstances as may appear necessary to illustrate this part of its pathology, as the symptoms and treatment will be given in the history of those diseases by which perforation is preceded or followed, and to which we shall occasionally refer.

1. Perforation of the Digestive Organs —This lesion most frequently occurs in that portion of the digestive tube situated beneath the diaphragm, and more frequently in the intestines than in the stomach. In both it may occur either during life or after death. In the former case it is the consequence of ulceration or mortification; in the latter it depends on the presence of an acid, formed most frequently in the stomach during the process of digestion. It occurs besides in the stomach in consequence of the introduction of irritant and acid poisons.

We are not disposed to believe, and we think that facts are wanting to prove, that perforation of the stomach or intestines takes place in consequence of inflammatory softening of the walls of these organs; but as the facts on which we found this opinion will be given in detail in the article Softening, we shall not enter at present upon the investigation of the numerous and important questions which this subject involves.

1. Perforation of the superior portion of the digestive tube is occasionally observed to take place in consequence of several of the diseases to which it is subject, as well as from some others which occur in some of the neighbouring organs. In the œsophagus it is occasioned perhaps most frequently by cancer, formed either in the walls of this tube or in the cellular tissue external to it. In this case the walls of this muscular tube may be destroyed within a limited extent without any communication being formed between it and any neighbouring cavity; or, if the disease extends to the trachea or pleura forming the mediastinum, a communication may be formed between the cavities of both, and that of the œsophagus, through which a portion of the food and drink of the patient may pass, and give rise to the most distressing symptoms. It is indeed owing to this circumstance alone that we are enabled to detect the existence of such a communication, at least between the trachea and œsophagus.

The upper part of the œsophagus behind the larynx is sometimes the seat of ulcers, which, ea

tending to the cellular tissue situated between it and the latter, form collections of pus which impede mechanically, to a certain degree, respiration and deglutition. The inferior portion of the œsophagus has several times been found perforated, particularly in children, in consequence, we believe, of the chemical action of the gastric acid after death.

Aneurisms of the aorta occasionally produce perforation of the œsophagus, into which the blood is effused in greater or less quantity, so that the patient may live only a few hours, or several days, after the occurrence of the accident. In some cases there is no difficulty of swallowing from compression of the œsophagus, so that the progress of the aneurism in that direction is not suspected till the perforation takes place. In others, this termination of the disease may be predicted from the obstacle opposed to the passage of the food or drink.

Perforation of the velum and palate is generally observed to take place in consequence of ulceration or necrosis, and in those persons who have taken large quantities of mercury for the cure of venereal diseases.

Perforation of the stomach occurs in consequence of ulceration and mortification of a limited portion of its walls. The ulcer which is found to have produced the perforation generally bears the characters of having been produced by chronic inflammation, that is to say, its edges are hard and thickened, although sometimes neither of these states, particularly the latter, is present. The extent of the perforation compared with that of the ulcer is always small, and its border, which is formed by the peritoneum, is generally smooth. Perforation arising from this cause is met with in general at the small curvature or pyloric portion of the stomach, rarely at the great curvature, and perhaps never at the fundus.

Perforation of the stomach from cancer may be mentioned at present, as this disease gives rise to perforation not only from the softening of the tissue of which it is composed, but also from the ulcerative process which accompanies its latter stage. Perforation of the stomach from cancer occurs, however, most frequently on account of the softening or sloughing of the cancerous tissue when it occupies all the coats of the stomach, and on this account the solution of continuity produced by these changes is larger than that occasioned by any other cause during life, except when it follows the operation of corrosive poisons.

Perforation from cancer may occur in any portion of the stomach, but is most frequently met with at the pyloric portion and at the small curvature.

It is rare that perforation from this cause is followed by a communication between the cavity of the stomach and that of the abdomen, on account, as we have before stated, of some of the neighbouring organs becoming united to the stomach before the perforation is completed. This very circumstance however, which prevents the establishment of a preternatural communication between the stomach and the cavity of the abdomen, gives rise, at some future period, to those complicated cases of perforation in which a direct communication is formed between two or more of the abdominal organs, or between these and the contained viscera of a neighbouring cavity, or the external surface of the body. Examples of these three modes of communication are met with as the consequence of perforation of the stomach. Thus, it is not rare to find the walls of the transverse arch of the colon perforated where they had before occluded a perforation of the stomach, and a communication established between the respective cavities of these organs.

In the same manner is occlusion of a perforation of the stomach by the diaphragm followed by perforation of the latter, from which the ulcerative or sloughing process by which this lesion had been produced, extends to the inferior lobe of the lung, which had become united to the diaphragm. In this manner a portion of the lung is destroyed, several of the bronchi are laid open, and a communication formed between these tubes and the cavity of the stomach, and consequently between the latter and the external surface of the body. Lastly, it sometimes happens that the cavity of the stomach communicates with the external surface of the body, from the successive perforation of the walls of this organ and of those of the abdomen.

In all the examples of perforation of the stomach to which we have alluded, this lesion is represented as having taken place from within outwards. It may, however, occur in the opposite direction, or, as is said, from without inwards. Examples of this kind of perforation are rarely met with, except in cases of cancerous tumours situated in the left lobe of the liver, the mesentery, or mesenteric and lymphatic glands, and in scrofulous enlargement of the latter glands.

Mortification, so far as we are aware, has not been known to give rise to perforation of the stomach, unless when it has been produced by the presence of an accidental tissue, such as that of cancer, as in the cases to which we have alluded, or when it follows the violent operation of powerfully irritant or corrosive poisons, directly applied to the walls of this organ. In this latter case the vitality, and, to a certain extent, the organization of that portion of the stomach to which the poison has been applied, are destroyed. The portion thus circumstanced sloughs, and the cavity of the stomach, if adhesion has not taken place between this organ and a neighbouring one, is laid open, and its contents pass into that of the abdomen. The solution of continuity thus produced, may vary from the fourth of an inch to two or three inches in diameter, and has mostly a round form. Its edges are seldom irregular, and should they happen to be so, they are not thicker than the walls of the stomach, unless blood or serosity has been effused into the cellular tunic; the density of the tissues of which they are formed is seldom or only partially increased, and never so diminished that they assume a gelatinous consistence. The colour which they present is either that produced by an accumulation of blood in the capillarics, or by the effusion of this fluid into the cellular tissues which enters into their composition, or by the chemical action of the poison, either on the blood or on the tissues which form the boundaries of the perforation. In the former case the edges are more or less red, or vascular,

or both; in the latter they possess either a yellowish or orange tinge, or various shades of brown, amounting to black, as if they were painted with bistre, or dusted over with charcoal-powder or soot. Irritating poisons may produce the former appearances, but not the latter, which we believe are the effects of those poisons only which possess acid properties, as the nitric, muriatic, sulphuric, and oxalic.

The *post-mortem* appearances of perforation of the stomach from the introduction of acid poisons, in particular, into this organ, still require to be investigated with greater care than hitherto has been done, and particularly by means of a series of experiments on living animals, before we can affix to them that diagnostic importance of which they seem susceptible, or refer to them with confidence as medico-legal evidence in cases of poisoning. Perhaps even in the present state of our knowledge on this subject, may the toxicologist derive more assistance from the study of the *post-mortem* appearances of perforation of the stomach from acid poisons than is generally believed. But in order to do so, he must be intimately acquainted with those of all the other forms of perforation, particularly that produced by the gastric acid after death. We shall give a general sketch of the physical and chemical effects of this acid on the stomach, and endeavour to point out the means by which they may be distinguished from those produced during life by the acid or irritant poisons which have given rise to perforation.

Perforation of the stomach, in consequence of the chemical action of the *gastric acid*, takes place almost always in the most depending part of this organ, viz. the fundus. In those cases in which it has been met with in other parts of the stomach, accidental circumstances have concurred which afforded a satisfactory explanation of this difference as to its seat. The size of the perforation is generally large, often occupies the whole of the fundus, and sometimes a part of the body of the stomach. Its form is almost always irregular; its edges are thin, ragged, more frequently fringed or filamentous. The tissues of which it is composed are soft, pulpy, gelatinous, and more or less transparent; either perfectly pale, of a milky hue, or streaked with lines or stripes of a pale yellow, orange, brown, or black colour. These colours are always most marked in, or limited to, the mucous and submucous tissues, the muscular and serous coats which form the fringed edges of the perforation being quite pale. It is of the greatest importance to observe that these colours are always accompanied with softening of the mucous and submucous coats to a greater or less extent beyond the perforation; or, if these coats have been destroyed, the muscular is found similarly altered. If the blood-vessels, whether the capillaries or larger branches, were filled with blood at death, this fluid, wherever the coats of the stomach are softened, presents either the brown or black colour of chocolate or soot, and assumes of course the form and distribution of the vessels in which it is contained. Such is always the chemical effect of the gastric acid on the blood after death, and therefore we arrive at the important conclusion that redness, whether arising from the effusion of blood or vascularity, is incompatible with perforation from this natural chemical agent.

From these, the most remarkable of the *post-mortem* appearances which accompany perforation of the stomach from the gastric acid and acid poisons, it appears to us that such evidence may be obtained as will enable us to distinguish perforation produced by the former from that produced by the latter.

The pulpy, thin, transparent, pale, fringed edges of the perforation from the gastric acid; its situation in the fundus of the stomach; the presence of softening of the coats of this organ beyond the perforation, accompanied with discoloration of the blood only where this softening exists, and the entire absence of redness under any form in the same situation, are characters which we do not believe belong to any other form of perforation. Were it necessary to seek for still stronger evidence in favour of this opinion, we would refer to the histories of the cases of the individuals in whom these appearances have been found after death, to the results of our own experience on this subject in animals, and in particular to that strong collateral evidence by which it is supported, viz. the entire absence of all the anatomical characters of peritonitis, such as redness, increased vascularity, coagulable lymph, or adhesions in the neighbourhood of the perforation, and in general of effusion of the contents of the stomach,—consequences which may be said to follow invariably and to a greater or less extent, perforation of the stomach from the acid poisons, or indeed any other pathological agent.

If we are correct in our estimate of the distinctive characters of this kind of perforation, it follows that this lesion cannot be confounded with any other, however similar to it, but produced by a different agent. The analogy which exists between the former kind of perforation and that produced by acid poisons depends, as we have already said, on the acid property of these poisons, and because, therefore, of the same kind of discoloration being present in both cases. The difficulty thus created is, however, not such as it has been represented; nay, we believe that the embarrassment of the toxicologist has arisen from his not being acquainted with those *post-mortem* appearances which we have endeavoured to show are so peculiarly characteristic of the chemical action of the gastric acid. We may observe besides, that the local characters of perforation from acid poisons are in several respects very different from those of perforation from the gastric acid, as will be seen by comparing the description which we have given of them with those which accompany perforation from the gastric acid, particularly as regards the situation of the former, the character of its edges, and the redness of the tissues surrounding it, to which we may add effusion of the contents of the stomach, and peritonitis.

Perforation from cancer or chronic ulceration never can be confounded with that from the gastric acid.

Perforation in consequence of an ulcer of the stomach from common inflammation, neither acute nor chronic, cannot, perhaps, be distinguished from perforation produced by irritant and even acid poisons. But as facts appear to be wanting

on this part of the subject, we must leave it in its present state of uncertainty without any further comment.

2. *Perforation of the intestines* takes place most frequently in consequence of ulceration; and in the great majority of cases in the inferior portion of the ileum, in the situation of the *glandulæ agminatæ*, or glands of *Peyer*. It may occur also in the points of the small and large intestines occupied by the *glandulæ solitariæ*, as well as in those of both intestines in which no follicles exist. The ulceration which preceded the perforation may have been either acute or chronic, but is far more frequently of the latter kind, and may have given no signs whatever during life of its existence. The ulcerated portion of the intestine is found either pale or presenting various degrees of redness and vascularity, and is accompanied with similar states of the surrounding mucous membranes. The changes in the thickness and consistence of this portion of the intestines present considerable variety, and vary with the degree and duration of the inflammation by which they have been occasioned. The perforation is sometimes not larger than to admit a common-sized probe; at other times so large as to admit the point of the fore-finger, or even of the thumb. Its edges are generally smooth, and more frequently circular than of an irregular shape, and are formed by the peritoneal coat, except in some rare cases, in which the ulceration has destroyed to the same extent the other coats of the intestine. Perforation of the small intestines may occur in one, two, or three of the glands of Peyer in the same individual, and in either case it almost always gives rise to a communication between the cavity of the intestine and that of the abdomen, followed by an effusion of the contents of the intestine, and peritonitis.

Perforation from ulceration may take place in the rectum, caput cœcum coli, duodenum, and indeed throughout the whole of the large and small intestines, where the mesentery separates to be reflected over them, without giving rise to much effusion or a communication with the cavity of the peritoneum. But this variety of perforation is chiefly met with in the rectum and caput cœcum, and is no doubt sometimes the cause of the abscesses which not unfrequently form in the cellular tissue in the situation of these portions of the intestinal tube.

In the intestines, as in all organs covered by a serous membrane, perforation from ulceration is always preceded by *sloughing* of this membrane. When the ulcerative process has destroyed the sub-serous cellular tissue, and consequently the vessels which supplied it with the materials of its nutrition, it soon dies, and is separated in the form of a pale or grey-coloured slough, or tinged with the colouring matter of the bile or fæces, and without the odour of gangrene.

Perforation from mortification of all the coats of the intestines, is, perhaps, never met with, unless in some cases of intus-susception and strangulated hernia. In the former case, the fæcal matter passes into the cavity of the peritoneum; in the latter, a similar consequence may follow, but much more frequently adhesion takes place between the intestine, before it perforates, and the walls of the abdomen, when the perforation of both takes place, and a communication is established between the cavity of the intestine and the external surface of the body, or what is called an *artificial anus* is formed.

We are not aware that there is a single example of recovery from peritonitis produced by perforation of the intestines. The patient may survive the accident only a few hours, and seldom survives more than two or three days, the length of time depending chiefly on the previous state of the patient, and the quantity of the fæcal matter effused, although some cases have occurred in which the quantity of this matter was so small that it could hardly be detected either by its presence or odour, while the symptoms were violent, and the disease proved rapidly fatal. See Fever, and Peritonitis *from perforation of the serous membrane.*

Perforation of the intestine from poisons has not, so far as we know, been observed. There are, however, several examples of its having been produced by the gastric acid after death, but which have been regarded by some pathologists as the consequence of disease; an opinion, the accuracy of which will be particularly examined in the article Softening.

Perforation of the intestines from without inwards is occasioned by the same diseases as those mentioned as giving rise to this variety of perforation of the stomach. Tubercles and abscesses are, however, the most frequent causes of it in the intestines. We have seen the former perforate the intestine in a number of points, without any traces of inflammation of the mucous membrane around the perforation, and without a communication being formed between the cavity of the intestine and that of the peritoneum. The abscesses which perforate the intestines are retro-peritoneal, and most frequently those situated in the loose cellular tissue situated in the ilio-cæcal region. The coats of the intestines, generally the cœcum or commencement of the colon, are gradually destroyed by ulceration, and a quantity of pus in proportion to the size of the abscess is evacuated by the anus.

The preternatural communications which are found to take place between the intestines and neighbouring organs, in consequence of perforation of the former, we have already alluded to generally, and they are by no means so frequent as when they are occasioned by perforation of the latter. Sometimes portions of the small intestines are found united together, and communicating with each other by means of several perforations, through which the liquid fæces pass in greater or less quantity, and examples have been met with in which the passage thus formed was lined with an accidental mucous tissue. In the cases of preternatural communications of this kind which we have seen, the perforated intestines were included in a common accidental serous envelope, the evidence of peritonitis having existed at some remote period; and the coats of the intestine more or less destroyed by tubercular ulceration, commencing in the glands of Peyer. We do not believe that the peritonitis, in such cases, was the consequence of the effusion of fæcal matter from perforation of the intestine. We believe, on the

contrary, that it is produced before the perforation of the serous membrane is accomplished, so that the coagulable lymph which is thrown out becomes organized and united with a neighbouring portion of intestine. Afterwards the ulceration proceeds, and the preternatural communications we have described are effected.

Another variety of preternatural communication of the small intestines, and which takes place in a manner similar to the former, is that in which there exists cellular adhesions between the perforated portion of intestine and the walls of the abdomen. The effused fæcal matter is prevented by the presence of this tissue from passing into the cavity of the peritoneum. In this tissue it collects in greater or less quantity, and as the abdominal parietes with which it is in contact are more susceptible to its stimulating effects than the former, they become inflamed, ulcerate, and are perforated, and a communication is established between the intestine and the surface of the body, through which the fæcal matter escapes. Andral mentions a case of this kind. Besides the fæcal matter there escaped an ascaris lombricoides, and several of these worms were found, after the death of the patient, contained in the cavity formed in the accidental cellular tissue which united the perforated intestine with the perforated walls of the abdomen.

Although it is said that worms perforate the intestines, we have never seen a case of perforation which could in any way dispose us to attribute it to such a cause. Were such a case to happen, it could only be in consequence of inflammation and ulceration excited by these animals; and yet we have found them very numerous,—in one instance amounting to thousands,—without the slightest trace of inflammation of the mucous membrane.

There are a few examples of the walls of the abdomen being perforated in consequence of large collections of purulent fluid in its cavity; and we may mention here that perforation of the diaphragm may take place in cases in which similar collections are formed in the cavity of the pleura.

3. Perforation of the walls of the liver, which form the boundaries of an abscess situated in this organ, and of the gall-bladder, may with propriety be noticed in this place. Perforation of the former, with effusion of the contents of the abscess into the cavity of the abdomen, is by no means common, because of adhesion taking place, previous to the occurrence of this accident, between the peritoneum covering the abscess, and that of the stomach, colon, walls of the abdomen, or diaphragm. Under these circumstances, however, the perforation may afterwards extend to the hollow organs we have named, and establish a communication between them and the cavity of the abscess, by means of which its contents are evacuated by vomiting or by stool. A communication between the abscess and the external surface of the abdominal parietes where they cover the abscess, is more common than the former. When the diaphragm adheres to the abscess, and is perforated, three consequences may follow:—the contents of the abscess may pass into the cavity of the chest; into the bronchi, from a portion of the lung which had adhered to the diaphragm having been destroyed by ulceration or sloughing; or into the cavity of the chest and bronchi at the same time. We have seen only one case of the last variety of perforation of abscess of the liver, or, more correctly speaking, of a purulent cyst containing a great number of hydatids. Although these vesicular animals have sometimes been expectorated in cases of this kind, such did not happen in the case to which we allude. The communication between the bronchi and cyst took place first, followed by a yellow-coloured expectoration, which, because of the existence of the cyst in the liver having previously been detected, was supposed to be owing to the passage of the bile into the bronchi from perforation. Soon afterward, symptoms of pleurisy manifested themselves, accompanied with those of effusion and pneumothorax, the real nature of which was not understood till after death. Only one opening was found in the diaphragm, where it covered a cyst from six to seven inches in diameter, containing a yellow, puriform fluid and hydatids. This opening, sufficiently large to admit the fore-finger, communicated with an excavation formed in the inferior lobe of the lung, which adhered but slightly to the diaphragm. In the bottom of this excavation there were several openings, some of them, which were small, communicating with the bronchi, others larger, leading into the cavity of the pleura. This cavity contained a quantity of air, yellow sero-purulent fluid, and a great number of large and small hydatids. The lung was considerably compressed, and the pleura covered with recent coagulable lymph.

Perforation of the gall-bladder occurs rarely except when biliary concretions, of considerable size, are lodged within it. In such cases the preternatural communication generally takes place between this organ and the ascending or transverse portion of the colon, through which these concretions pass into this intestine, and are voided by stool. A similar mode of transmission is afforded them when they are enclosed in the ductus communis choledochus. Their transit from either of these situations into the intestine may be accompanied with violent paroxysms of pain, or no pain at all; a difference which is not easily explained. In one case, in which the pain was extremely severe, and which terminated fatally, we found the duodenum perforated in four or five points near the pylorus, and communicating with the gall-bladder, which contained two large concretions. In two other cases, on the contrary, from the history of which we could not learn that the patients had ever suffered from any of those symptoms attributed to the passage of gall-stones, and who died of diseases unconnected with any derangement of the hepatic organs, we found in one of them a communication existing between the gall-bladder and the colon, in which a concretion was lodged and projecting into the latter, the mucous membrane and other coats of this intestine being quite healthy. In the other case there existed a similar communication, presenting the character of a fistulous passage (for it was lined with a mucous membrane), about half an inch in length, into which a small probe only could be passed. The gall-bladder was empty and greatly atrophiated in both cases, the natural consequence of the cessation of its function. Perforation of the gall-bladder from ulcera-

tion is not common. The only case worth noticing which has come under our observation, was one in which double perforation took place from ulceration of the walls of this organ. One of the perforations was situated towards the free surface of the gall-bladder, and was prevented from communicating with the cavity of the abdomen by the adhesion of a portion of the epiploon: the other was formed where this organ is in contact with the liver, so that the bile was effused between them, and had formed for itself a cavity of considerable size, covered superiorly only by the peritoneum, which rose above the surface of the liver. On this account it could be felt through the parietes of the abdomen, accompanied with the sensation of fluctuation, circumstances which led the physician to diagnosticate the existence of an abscess of the liver. Caustic potash was applied preparatory to laying it open, but the patient died two days after, before this plan of treatment could be carried into effect.

II. Perforation of the Respiratory Organs.—As perforation of the bronchi and pleura will be described in the articles Pleurisy and Pneumothorax, and as a description of it produced by mortification has already been given under that head, we shall only mention a few facts, with regard chiefly to the comparative frequency of its occurrence in the tubercular diseases to which the lungs and some of the neighbouring organs are subject.

The presence of tuberculous matter in the lungs is by far the most frequent cause of perforation of the pleura or bronchi, both of which it destroys within a limited extent, by means of the ulceration or mortification which its presence occasions. It is only when situated beneath the pleura that the tuberculous matter gives rise to a communication between the cavity of this membrane and the bronchi, or when a tubercular excavation occupies the same situation. The escape of the air into the cavity of the pleura is not always the consequence of perforation of this membrane and of the bronchi. We have already stated that the opening in the former is sometimes closed by adhesion of the pleura, and by accidental serous or cellular tissues, which consequently prevents the air or other fluids from passing into the cavity of the chest. It is in this way that perforation of the thorax takes place, and that a communication is established between the surface of the body and the bronchi, through which the air enters and escapes. But should the perforation take place in the mediastinum and bronchi, the inspired air is effused into the cellular tissue included within the former, whence it passes to that of the neck, face, and chest, and may produce extensive and distressing subcutaneous emphysema.

Perforation of the bronchi without perforation of the pleura is a much more frequent occurrence than the former, in whatever part of the lung the tuberculous matter may have been deposited. In this case the bronchi may be simply perforated, or perforated and communicating with a tubercular excavation. Perforation of the bronchi is not an unfrequent consequence of the accumulation of tuberculous matter in the bronchial glands, or the presence of cretaceous matter in these bodies. The former occurs in young persons, and especially in children: the latter sometimes in middle-aged persons, but most frequently in those advanced in life.

This kind of perforation may sometimes be detected during life, from the presence of considerable masses of tuberculous matter or concretions in the sputa. Perforation of the bronchi from the latter cause undergoes sometimes a cure, from obliteration or cicatrization.

The most fatal kind of perforation of the bronchi is that which is accompanied by perforation of a large branch of the pulmonary artery. This complication takes place in two ways:—first, a large bronchus, most frequently the first or second branch of the trachea, and a corresponding branch of the pulmonary artery, are perforated by a tuberculated bronchial gland situated between them. In this case a direct communication is formed between the blood-vessel and bronchus, and the hemorrhage which ensues is so great and rapid, that the blood is thrown forth as if vomited, sometimes by the nose as well as the mouth, and may terminate fatally in from ten to twenty minutes; secondly, a tubercular excavation with which several bronchi communicate, extends in the direction of the pulmonary artery or one of its principal branches to which it adheres. The corresponding portions of the walls of the artery and those of the excavation ulcerate or slough, and hemorrhage takes place, first into the excavation, and afterwards into the bronchi. It is on account of this indirect communication between the perforated vessels and bronchi that hemorrhage in cases of this kind is generally small at first, diminishes and increases at irregular intervals, and sometimes continues for several days.

Perforation of the pleura from abscess, and the effusion of blood under the pleura in pulmonary apoplexy, are not common. In the cases which we have seen of the latter kind, the pleura appeared to have sloughed because of its having been separated from the cellular tissue by the effused blood.

Chronic pleurisy with effusion sometimes terminates in perforation of the walls of the chest or diaphragm; and there are examples of fluid making its way into the bronchi, whence it was expectorated, and the disease terminating favourably.

For perforation of the bronchi and trachea from aneurism, see Aneurism of the Aorta.

III. Perforation of the Organs of Generation.—Perforation of these organs in the female, after the middle period of life, is very common, and, in the great majority of cases, in consequence of cancer. Cancer of the uterus and vagina may give rise to perforation of the walls of both, and a communication be established between them and the following organs: between them and the bladder, or rectum separately, or between them and both of these organs at the same time. Hence the urine, fæcal matter, or both, may be passed in greater or less quantity by the vagina, and sometimes the latter makes its way also into the bladder.

Perforation of the posterior walls of the neck of the uterus or upper portion of the vagina, is not unfrequently followed by perforation of the

peritoneum, and as the progress of the disease upwards is generally accompanied with sloughing of the cellular tissue behind this membrane and the neck of the uterus, a putrid sanies is poured into the cavity of the former, which gives rise to peritonitis, rarely less violent than that which is occasioned by the presence of fæcal matter. Perforation of the peritoneum is sometimes arrested by the adhesion of a portion of small intestine, which may either remain entire, or afterwards become perforated. The latter is the more frequent occurrence.

Caries and necrosis of the bones of the sacrum may give rise to perforation of the upper part of the vagina, from the ulceration and sloughing of the cellular tissue situated between them extending to the latter organ. Such a case may readily be confounded with perforation from cancer.

Perforation of the ovaries and Fallopian tubes seldom occurs. We have met with it in one of the latter, between which and the rectum there existed a communication, through which a purulent fluid, the contents of the tube, escaped, and was passed by the anus. In another case, in which the left ovary was transformed into a purulent cyst, similar consequences followed. Both patients died of other and complicated disease of the uterus. In another case, a communication existed between the left Fallopian tube and ovary. The ovary formed a cyst as large as the two fists; the Fallopian tube was from an inch to two inches in diameter, and both were filled with a sero-purulent fluid, none of which, however, appeared to have passed into the cavity of the uterus. For further information on this subject, see DISEASES OF THE UTERUS AND OVARIES.

IV. PERFORATION OF THE URINARY ORGANS.—1. Perforation of the bladder occurs most frequently in the female, and from the extension of cancer of the uterus, to which we have already alluded. It is also occasioned by ulceration or sloughing in consequence of pressure during pregnancy or delivery; chiefly in deformity of the bones of the pelvis, or from the improper use of instruments when employed to extract the fœtus.

In the male it is more often occasioned by the catheter left in the bladder in cases of paralysis of this organ, and in stricture of the urethra in old men, than by any other cause. The perforation is generally the consequence of sloughing of the walls of the bladder which were in contact with the point of the catheter.

2. Perforation of the walls of the kidneys seldom occurs. When it happens, the loose cellular tissue with which these organs are so abundantly surrounded, becomes the seat of abscess. In one case of this kind which we examined, a small abscess was situated between the kidney and descending colon, and communicated with the cavity of this intestine. In another, an abscess containing several pints of pus, and situated between the kidney, descending colon, and lateral walls of the abdomen, likewise communicated with this intestine. The quantity of pus passed by stool in the latter case was considerable. The substance of the kidney was almost entirely occupied with tuberculous matter, as well as the infundibula and pelvis. In the former, the pelvis of the kidney contained a large calculus, and its substance was converted into a firm uniformly grey tissue. Both cases terminated fatally. The patient, a female, in whom the former case occurred, was about twenty years of age; the other was a man above fifty.

V. PERFORATION OF THE ORGANS OF CIRCULATION.—Perforation of these organs may be considered as it occurs in the heart, arteries, and veins. The occurrence of this lesion in the arteries is infinitely more frequent than in the heart or veins, owing obviously to their being subject to diseases which rarely affect the latter, as well as to the impulse of the blood, and the distension occasioned by this fluid propelled into them by the heart: thus perforation of the arteries, in the great majority of cases, takes place in consequence of the deposition of a substance resembling bone, chalk, or putty, which often destroys their walls, or deprives them of their elasticity. In the first case, the internal and middle coats may be perforated without their having undergone any previous change of capacity, so that the cellular coat, being brought in contact with the blood, is pushed outwards by this fluid, and forms what is termed *circumscribed false aneurism*. In the second case, the internal and middle coats being deprived of their elasticity by the presence of one or other of these substances we have named while yet in a fluid state, yield to the continued impulse of the blood, and ultimately form a sac or pouch of various dimensions, occupying either a portion or the whole of the circumference of the artery, and which, under these circumstances, constitutes what are commonly called *circumscribed* and *diffuse true aneurism*. Perforation of the dilated coats of the artery takes place at a subsequent period, first in the internal and middle, and afterwards in the cellular. In whichever of these ways the aneurism is produced, perforation of the cellular or outer coat of the sac may take place under the two following circumstances;—first, when the surface of the aneurism is free from adhesion with a neighbouring organ, as sometimes happens when it is lodged in the thorax or abdomen, when the blood is poured into the serous cavity of either of these parts of the body; secondly, after the aneurism has become united with a neighbouring hollow organ, or the walls of the cavity in which it is contained, when, after the perforation of either of these, the blood is effused either directly on the surface of the body, or escapes by one of the natural passages, for example, the œsophagus or trachea.

Perforation of the arteries (we speak of the larger branches or trunks) is not unfrequently the consequence of ulceration proceeding from without inwards. When this happens, the ulceration may take place originally in the walls of the artery which becomes perforated; or in a portion of an organ in the immediate vicinity of an artery, to which it afterwards extends, producing a solution of continuity of its walls. We have already given examples of perforation of the former kind in the case of tuberculated bronchial glands; and examples of the latter are met with in several organs, and particularly in the stomach in some cases of chronic ulcers, in which one of the coronary arteries of a large branch happens to traverse the bottom of such an ulcer, and becomes perforated by the ulcerative process.

When cancer produces perforation of an artery, it is, in general, owing more to the walls of the vessel having been destroyed by the extension of this disease to them than by ulceration. The same is the case in perforation of veins from a similar cause. These vessels are not so often perforated by ulceration as the arteries, and the hemorrhage is seldom great unless they are considerably dilated, as in hemorrhoids; or their walls much thickened and united with indurated cellular tissue, which prevents them from collapsing, as sometimes happens in the case of chronic ulcers of the inferior extremities, accompanied with varicose dilatation of the veins. In a case of this kind which we had occasion to examine, the hemorrhage which followed the perforation of the vein was so great that the patient, a man about forty years of age, expired in little more than ten minutes.

There are a considerable number of examples of perforation, more commonly termed *rupture*, of the heart. The portion of this organ the most subject to this lesion is the inferior and middle portion of the left ventricle. Sometimes softening or ulceration, at other times atrophy of the muscular substance in the situation of the perforation, are the lesions which are found to precede the occurrence of this accident; at the same time, the walls of the ventricle are, in general, more or less hypertrophiated.

There may be one, two, or three perforations which traverse the walls of the ventricle either perpendicularly or obliquely. In the latter case the hemorrhage which ensues does not, it is said, prove so suddenly fatal as in the former case. It does not appear that the *quantity* of blood effused bears a necessary relation to the length of time that supervenes before death takes place.

We have no certain evidence to show that perforation of the heart is curable, although Rostan relates a case in which he conceived he saw the cicatrix of a perforation of the left ventricle in a patient, who was supposed to have presented the symptoms of this lesion some time before her death, which was occasioned by a second perforation.

Perforation of the valves of the heart is seldom observed except in those of the aorta, and in the cases which we have seen, it appeared to be the consequence of the presence of osseous or cretaceous matter deposited in their substance or between their laminæ.

VI. Perforation of Hollow Bones occurs in cancerous affections of their walls, and when pus or hydatids are contained within them. The latter generally produce perforation by exciting inflammation and caries of the bone; the former, by the gradual transformation of a portion or the whole circumference of the bone into a lardaceous or cerebriform substance. In this case, fracture more frequently takes place than perforation of the bone.

VII. Perforation of the Eye. — The cornea is that part of the eye which is most frequently perforated. It may be in consequence of ulceration or sloughing, accompanied or not by similar diseased states of the other tunics of the eye; by an accumulation of pus, or the presence of malignant tumours proceeding from within outwards. (See Ophthalmia.)

VIII. Perforation of the Ear. — Perforation of the membrane of the tympanum is not very rare in severe cases of inflammation of the internal ear terminating in suppuration. The solution of continuity of the membrane, which follows the accumulation of the pus in the cavity of the tympanum, may be the consequence of ulceration or sloughing, favoured by the mechanical distension to which it is at the same time subjected. So soon as the perforation is completed, a sudden and copious discharge of puriform fluid makes its appearance, and which, if there has been no discharge before from the external orifice of the ear, may be regarded as a certain sign of its coming from the cavity of the tympanum in consequence of perforation of its membrane.

The effects of perforation of the tympanum on the function of hearing depend on the size and situation of the artificial opening, and the degree of integrity of the *ossicula* with which this membrane is connected. Suppurative inflammation of the bony structures of the internal ear may produce in a similar manner perforation of the *membrana tympani*, as well as accidental products developed in the same situation.

R. Carswell.

PERICARDITIS. — I. Of Pericarditis. — The anatomical characters of acute inflammation of the pericardium are, 1, preternatural redness of the membrane; 2, coagulable lymph, adhering to its surface; and 3, fluid effused within its cavity. These characters we shall treat of in succession, and at some length; for as the anatomical characters are the key to the symptoms, the latter cannot be understood, and, consequently, so rapid and fatal a malady cannot be treated with the promptitude and decision essential to the safety of the patient, unless the nature of the former and their intimate connection with the symptoms are thoroughly known to the practitioner.

1. *Preternatural redness of the pericardium.* — The redness very seldom pervades the whole of the inflamed portion. It presents itself sometimes in numerous small scarlet specks, with a natural colour of the intervening membrane, sometimes in spots of greater or less magnitude formed by the agglomeration of the specks, and sometimes in patches of considerable extent. Even these, however, have, almost without exception, a dotted or mottled character. In some cases, according to Laennec, though the inflammation, judging of it by the thickness of the false membranes, had been very severe, scarcely any redness exists. Vascular injection of an arborescent and sometimes stellated appearance, accompanies redness, and is generally proportionate to it in degree. Occasionally, however, the redness is uniform, like a stain.

The pericardium is very rarely, if ever thickened; that which is often regarded as thickening being nothing more than superimposed and intimately adherent false membrane.

When acute pericarditis degenerates into chronic, the redness loses its brilliancy, sometimes becoming very deep and of a brownish colour,

and sometimes acquiring a cinnamon hue. Beneath a layer of lymph of this colour, we have seen the surface of the heart of a bluish-white appearance, like the spots so frequently found on this organ.

Redness alone does not afford conclusive evidence of pericarditis, as all serous as well as mucous membranes are liable to vascular injection from various causes independent of inflammation. To afford such evidence, therefore, the redness must be conjoined with an effusion of lymph or sero-purulent fluid.

2. *Coagulable lymph adhering to the surface of the Pericardium.*—The inflamed pericardium secretes serum and lymph conjointly, and in a fluid state, from the same vessels. Soon after the secretion has taken place, the lymph concretes, while the serum remains fluid. The former, when recent, is of a pale straw-colour, and of a soft tender consistence, becoming firmer and more tenacious as it grows older. Though occasionally deposited in detached lumps and specks, it generally forms continuous layers, sometimes covering a portion only, but more commonly the whole, or nearly the whole, of the pericardium. The thickness of the deposition may vary from a line to an inch; but from a line and a half to three lines is its ordinary mean. Its adherent surface is smooth; the opposite or free is rough and singularly figured. It is sometimes pitted with small depressions at tolerably regular intervals, presenting the aspect of a fine reticulation, or of the section of a sponge. This occurs principally where the layer is thin: where it is thick, the surface is distributed into more spacious cells, often as large as a pea, and separated by coarser partitions. The partitions are sometimes irregular, being higher and thicker in one part than another, in which case the effect is exactly that produced by separating two flat plates between the surfaces of which a layer of soft butter has been spread. At other times the partitions are very regular; in which case the appearance, as Corvisart observes, is analogous to that of the second stomach of a calf. Occasionally they are very thick and rounded, and then they have an appearance somewhat similar to that of a congeries of small earthworms. Not unfrequently they are shaggy and flocculent, hanging in shreds like tow. Sometimes no cells are apparent, but the lymph is arranged in transverse, and, as it were, plaited wrinkles, like undulations of sand on the seashore. When lymph becomes old, and not adherent, it acquires a deeper hue, varying from cinnamon to an intense brown-red or mahogany colour. When of the latter colour, it usually secretes bloody fluid.

Now, what is the object which nature proposed to herself in the effusion of lymph? Unquestionably to effect reparation—the object for which the effusion is designed in whatever part of the system it takes place. But how, it may be inquired, can it effect reparation in the pericardium? By causing adhesion. Supposing that the inflammatory process does not terminate by resolution—by the complete absorption of both lymph and serum, the most desirable termination which remains is adhesion; for should this not take place, the lymph becomes a secreting surface, which effuses more and more lymph and serum, until in a short time the cavity is completely distended, and the action of the heart so embarrassed that a fatal termination speedily ensues. But, should adhesion of the opposite surfaces take place, by which further effusion is prevented, life may be prolonged for a considerable period, even for years; though, as will presently be explained, the adhesion, so far from being a perfect reparation, gives rise to another form of organic disease, which eventually proves destructive to the patient.

Adhesion takes place in some cases and not in others,—a circumstance which has been attributed to a difference in the quality of the lymph, dependent on the greater or less energy of the inflammation, in consequence of which it possesses different degrees of aptitude for adhesion. This explanation, though perhaps not unsound, is scarcely applicable to the pericardium; for here the union or non-union depends mainly on the absence or presence of fluid in the cavity: the best lymph, equally with the worst, being incapable of uniting when interposed fluid prevents the apposition of the opposite surface. Hence it is that the upper part of the pericardium, where it is reflected from the great vessels, often adheres when the lower part does not: and for the same reason it is that, when the whole of the peritoneum is covered with lymph, the intestines adhere to each other, but their adhesion with the walls of the abdomen is prevented by the interposition of fluid.

Hence the immense importance in pericarditis, of prompt and energetic treatment in the first instance, in order, if resolution cannot be effected, to cause absorption of the fluid, and thus afford the opportunity for adhesion. Temporising indecision is inadmissible; for unless one or other of these terminations be induced, the patient inevitably dies.

Such is the object of adhesion: we have now to describe the process. When the fluid has been sufficiently absorbed, the depositions of lymph on the opposite surfaces of the pericardium come in contact, thicken, blend, and gradually become organized by vessels presenting themselves under the successive appearances of blood-stains, straggling lines, and, lastly, of uniform pinkish vascularity, susceptible of injection from the pericardium. The depositions are thus converted into perfect cellular tissue, by which the contiguous parts are more or less firmly, closely, and extensively agglutinated. When adhesion is of recent standing, the lymph is generally thick, and separable by mere tearing into two layers, one adhering to each fold of the pericardium. In proportion as the disease is older, the false membrane is thinner and firmer, consisting, in cases that date several years back, of the finest layer of dense cellular tissue. In some, even this is not perceptible, the folds of the pericardium having become amalgamated—apparently without the intervention of any membrane,—so as with difficulty to be separable, even by the scalpel. It is in such cases that pathologists have sometimes erroneously supposed the heart to be destitute of a pericardium.

In some rather protracted cases, generally of at least two or three months' duration, where, though

adhesion has been established, inflammation has either recurred or never been completely subdued, an additional interstitial deposition of lymph takes place, which has been known to thicken the adventitious mass to the extent of an inch and upwards. In this case it sometimes possesses a laminated texture, the layers of which are progressively redder in proportion as they are nearer the heart; and sometimes it exhibits different degrees of consistence in different parts, one being almost liquid and purulent, while another has the density of tubercular induration. (*Latham*, Lond. Med. Gaz. vol. iii. p. 5.) Such cases are ordinarily fatal at no very remote period.

But adhesions are not always universal; in cases of partial pericarditis they are restricted to the portions inflamed; and when these portions are limited, the adhesions are not close or intimate; for as the gliding motion of the heart within the pericardium is not prevented, it stretches the adherent lymph, and converts it into long loose bands of cellular tissue. But when the portions inflamed are extensive, partial adhesions are sometimes close and firm, and the intervening parts of the pericardium may be healthy and in contact. Instances occasionally occur of adhesions being partial though the inflammation had been universal; and the parts not united are overspread with lymph and separated by purulent fluid, thus constituting a series of small, detached abscesses around the heart.

Cases of partial pericarditis (exclusive of white spots, of which we shall presently speak) are very rare in proportion to those of general, scarcely amounting, according to Laennec, to one in ten. (De l'Auscult. Med. tom. iii. p. 655.) They almost always terminate in recovery, and the adhesions, if loose and long, seldom lead to enlargement of the heart.

Partial pericarditis sometimes leaves no other vestiges than opaque white or milky spots, which are a well-known appearance on the surface of the heart. They vary in extent from a few lines to two or three inches in diameter; their thickness is about that of the nail: they consist of condensed cellular tissue, and with a little care they may generally be detached without injury to the pericardium beneath. This membrane is commonly somewhat injected, though not thickened.

Sometimes lymph is converted into small, roundish, soft granulations, like concrete albumen, with which the pericardium is more or less extensively studded.

3. *Fluid effused within the cavity of the Pericardium.*—It has been stated that serum is effused conjointly with lymph, from the vessels of the inflamed pericardium. This fluid is sometimes transparent, and either of a faint yellow, more or less tinged with green, like that of the interior of a lemon, or of a pale fawn colour; at other times it is less transparent, but very seldom milky or opaque from containing particles, filaments, or flakes of imperfectly concrete albumen. Its quantity, though variable, is in general considerable at the commencement, that is, within the first two, three, or four days of the disease, — not unfrequently amounting to more than a pint. Corvisart once found four. It is speedily diminished, however, by absorption, when the first violence of the inflammation begins to subside; and after the lapse of a few days it is, in the majority of cases, not more abundant than the concomitant exudation of lymph. Sometimes, indeed, even in very acute inflammation, the absorption is so complete that no serum whatever is found, while a copious exudation of thick concrete lymph fills and agglutinates the whole cavity.

Should complete absorption of both the fluid and lymph not take place, nor yet adhesion of the pericardium be established, the fluid presently assumes a very different character. For it is no longer secreted by the pericardium, but by the lymph itself, which, when organized, becomes a secreting surface; and its secretion, though at first consisting of clear serum, gradually becomes more and more turbid, milky, and opaque, until it eventually assumes the character of pus. Rarely, however, is perfect pus found in the pericardium; probably because the patient dies from irritation before the suppurative process is fully established. Not unfrequently the fluid is bloody, and the lymph of a red colour. This is attributable to the tenderness of all newly organized structures, in consequence of which they are apt to become congested, and to effuse blood when subjected to any unusual irritation or excitement. The excitement in the present instance most probably consists in inflammation of the adventitious membrane, either renewed, or never wholly suspended.

Compression, exercised by fluid, and even by great accumulations of lymph, sometimes reduces the volume of the heart, and renders it atrophous.

Such are the anatomical characters of acute pericarditis, both in its early and its advanced stages. It remains to make a few remarks on that form of pericarditis which appears, from the mildness of the inflammatory symptoms, to have been chronic from the first. Its anatomical characters do not differ very materially from those exhibited by the advanced stages of the acute form. The inflammation always pervades the whole of the cavity; the redness is deeper and duller than in the acute affection; the albuminous false membranes are, in many cases, totally deficient, and when present, they are thin, soft, and fragile, as if wasted by suppuration: finally, there is always a more or less abundant effusion of turbid, milky, and sometimes completely puriform fluid. *Intimate* adhesions of the pericardium to the heart may follow the absorption of this fluid; but M. Laennec does not appear to be borne out either by facts or by analogy, when he supposes that chronic pericarditis alone is the cause of intimate adhesion, and that the acute affection only gives rise to loose adhesion by more or less elongated bands. According to our experience, the latter is the more frequent cause of intimate adhesion.

The muscular substance of the heart is, in general, not affected by pericarditis; but sometimes it is rendered redder or paler, browner or yellower, harder, softer, or more lacerable, than natural. These changes result from inflammation propagated from the pericardium to the muscular substance. They will be more fully considered in the article Carditis.

In scrofulous and phthisical individuals, tuber

cles are sometimes developed in the false membranes of pericarditis, and, according to Laennec, they may cause the acute to pass into the chronic state, as frequently happens in the case of pleuritic and peritoneal false membranes.

Signs and Diagnosis of Pericarditis.

General signs.—There is no inflammatory affection of which the diagnosis has been considered more difficult than pericarditis. Laennec states that he has often, on dissection, discovered the disease, in a severe form, when nothing had afforded a suspicion of its existence; and, on the other hand, that he has frequently witnessed all its signs without finding a vestige of the malady. Dr. Latham mentions two cases of what appeared to be, and was treated as, marked inflammation of the brain; yet this organ was found perfectly sound, and the heart affected with intense pericarditis. (Lond. Med. Gaz. vol. iii. p. 209.) Andral relates a similar case. (Clinique Médicale, vol. iii. p. 444.) It is proper to keep these difficulties prominently in view, in order that practitioners may be better prepared to contend with them. But it must be added that such cases as those of Latham and Andral are extremely rare; and that, with the improvements in diagnosis introduced by modern research, the disease may, we feel assured from numerous post-mortem examinations, be nearly always detected. We shall first enumerate the symptoms, and then endeavour to point out the causes of their obscurity, the means of rendering them available, and the diagnosis from other inflammatory affections.

The symptoms are as follows; acute inflammatory fever; a pungent, burning, lancinating pain in the region of the heart, shooting to the left scapula, shoulder, and upper arm, but rarely descending below the elbow, or even quite to it. The pain is increased by full inspiration, by stretching the left side, and especially by pressure between the præcordial ribs, and by forcing the epigastrium upwards underneath the left hypochondrium. When the inflammation is only subacute, the pain is more or less dull, and does not lancinate. The next symptoms are, inability of lying on the left side, and sometimes in any position but one, which is most commonly on the back; [the writer has often observed the incapacity of lying on the left side to be wanting;] dry cough; hurried respiration; palpitation of the heart, the impulse of which is sometimes violent, bounding and regular, though its beats may at the same time be unequal in strength; at other times it is feeble, fluttering, and irregular; pulse always frequent, and generally, at the onset, full, hard, jerking, and often with a thrill. Sometimes it maintains these characters throughout, but more commonly it becomes, after a few days, weaker than accords with the strength of the heart's action, and, in the worst cases, small, feeble, intermittent, irregular, and unequal. Occasionally it possesses the latter characters from the commencement; whenever they exist, they are accompanied by dyspnœa; a constrained position, deviation from which induces a feeling of suffocation; extreme anxiety; a peculiar drawn or contracted appearance of the features, occasionally with the sardonic grin; faintness, constant jactitation, insupportable distress and alarm, cold perspiration, and, finally, from obstruction of the circulation, by intumescence and lividity of the face and extremities.*

One cause of the obscurity of the above symptoms would, at first sight, appear to consist in their diversified, incongruous, and variable nature. The pulse, for instance, displays, at one time or other, almost every kind of character; the disease, though the inflammation be equally intense, is sometimes very supportable—at others, agonizing; in one case it terminates fatally in two or three days, in another it lasts as many weeks.

Now, in reality, these diversities, while they do not render the symptoms less pathognomonic of the disease in general, as will presently be shown, are invaluable indications in another point of view—they denote the nature and progress of the anatomical changes of structure, and, in correspondence, the progress and exact state of the malady. For it is ascertained by experience that a difference in the quality and quantity of the effusion imparts a totally different aspect to the symptoms. Thus, when, either from the effusion consisting principally of concrete lymph, or from the simultaneously secreted serum being absorbed, universal adhesion of the pericardium promptly takes place, preventing all further fluid effusion, the action of the heart maintains throughout much the same vigour and regularity as it manifested at the onset of the malady, and the pulse exhibits corresponding characters of strength, hardness, and regularity. Under these circumstances, also, the position is less constrained, and less pain is produced by an unfavourable one; in consequence, perhaps, of the heart being curbed by the adhesion, and thus prevented from impinging with the same degree of violence against the thoracic walls. Finally, as the force and rhythm of the heart's action, and consequently the circulation, are adequately maintained, the life of the patient will be prolonged probably for weeks, even though the inflammation remain unsubdued, and he will sink, at last, apparently from mere exhaustion by the effects of protracted irritation.

But should there be a copious serous effusion, the heart's action is mechanically embarrassed by the compression that the fluid occasions,—a compression which is the more considerable because the pericardium, deprived of its distensibility by inflammation, is incapable of yielding as the fluid accumulates. Hence the organ, unable to transmit its contents, becomes congested: it flutters, intermits, beats feebly, irregularly and unequally. The pulse has corresponding characters, and is sometimes scarcely perceptible. Hence supervene faintness, dyspnœa, anxiety, coldness, lividity, a sense of suffocation on the slightest deviation from a certain position, with all the other symptoms indicative of an obstructed circulation. If this state be not expeditiously relieved by remedies, the patient dies in the space of a few days, or even hours.

Should the fluid be copious from the first, this series of symptoms will make its appearance equally early; but in general, two or three days elapse before the accumulation becomes considerable; in which case the former series will exist during this period, and will then be suddenly replaced by the latter. In a few instances we have

* We have seen extensive œdema of the feet supervene during the last twelve hours of life.

found the latter exist when the quantity of fluid was inconsiderable, but that of lymph enormous. We conceive, therefore, that an enormous accumulation of lymph has the same effect as fluid in embarrassing the action of the heart. We have also found the worst class of symptoms occasioned by a less quantity of fluid in some cases than in others,—a difference which probably depends in some instances on diversities in the nervous irritability; but in others we suspect that it is connected with the coexistence of carditis; for, when the affection has been thus complicated, we have known the feeble, fluttering action of the heart and all its concomitant train of unfavourable symptoms, occur, though the effusion within the pericardium was inconsiderable. The peculiar expression of the features is occasioned by the sympathy subsisting between the respiratory nerves of the face and those of the heart.

Such are the causes of the symptoms. It will now be apparent that their variability is calculated to enlighten rather than to perplex the practitioner; and that, whatever aspect they assume, they would still be abundantly sufficient, did no other difficulties interfere, to render the disease one of easy diagnosis. But unfortunately there are other difficulties. Some of these consist in the absence or mildness of certain of the most important symptoms.

When pain in the immediate situation of the heart, increased by pressure in the interspaces between the ribs, or upwards under the left hypochondrium, is accompanied by increased action of the organ and by fever, there can scarcely be a doubt of the existence of pericarditis. But sometimes, though rarely, pain is totally absent; in which case the practitioner must carefully employ pressure, as above directed; and if, notwithstanding, no pain be felt by the patient, he must carefully turn his attention to the remaining symptoms. Should the pulse be feeble, faltering, intermittent, unequal, &c., without any apparent adequate cause, (and it is well known to practical men that such a pulse rarely if ever exists in ordinary cases without a discoverable cause,) this sign,* especially if attended with the usually concomitant signs of an obstructed circulation, affords evidence of the strongest description.

But there may be neither pain nor an unsteady pulse. In this case, should the action of the heart be violent, and of a remarkably bounding or jerking nature, without any manifest cause,—especially organic disease of the organ; and should it be accompanied by a greater degree of fever and anxiety than can be accounted for by any other existing complaint; finally, should it be attended with the stethoscopic signs presently to be described, the physician will seldom be wrong in diagnosticating pericarditis. The presumption is still stronger if, when the symptoms supervene, the patient is affected with acute or subacute rheumatism,—an affection which, whether severe or mild, whether in its early or its later stages, is beyond comparison the most frequent cause of pericarditis.

It was an opinion of Corvisart that the most acute cases were the most obscure, because, says he, "the attack is abrupt, the progress rapid and the termination always sudden." This obscurity was felt by that acute observer because he was not acquainted with any signs of the disease on which he could depend but the feeble, unsteady pulse the anxiety, dyspnœa, lividity, and other symptoms dependent on obstruction of the circulation,—symptoms which did not always show themselves early enough to afford him data for the diagnosis before the case was hopeless. At present, however, when we are in possession of so many signs, the same obscurity does not exist. We have seldom experienced, nor have we seen other physicians experience, much difficulty in recognising the acute pericarditis to which Corvisart refers. The most obscure cases are those mentioned by Latham and Andral, in which an inflammation of the brain or any other organ diverts the attention from the heart, and the delirium of the patient renders it impossible to obtain information from himself. Still, when apprised that such cases exist, we should think it perhaps not impossible to provide against them. If, for instance, it were the general practice, (one which we invariably pursue,) to place the hand on the præcordial region as well as on the pulse in every severe inflammatory or febrile affection, in the same way that we daily feel the abdomen in cases of fever, even though the patient make no complaint of it, we should seldom fail to find an inordinately increased impulse or some other anomaly in the action of the heart, which would lead us to make a regular and probably successful investigation for pericarditis. For there can be little doubt that the symptoms in the cases alluded to, are in reality not absent but merely masked by others of predominant severity. Such an investigation is especially necessary in young children, who cannot explain their sensations, and seldom give indications of the existence even of acute pain.

The only remaining cause of obscurity is, inflammation of some of the thoracic viscera, particularly the pleura, the pain of which may be seated over the heart. Pleurisy may be detected by ægophony, extensive dulness on percussion, and diminished or absent respiratory murmur. Peripneumony may, in addition to its ordinary symptoms, be recognised by the crepitous rhonchus, deficient respiratory murmur, and dulness on percussion; finally, bronchitis may be known by the mucous, sibilous, and sonorous rhonchi. Should none of these signs be present, the negative evidence thus obtained fixes the disease on the heart; but should they be present, the diagnosis of the pericarditis must be made by a general comparison and cautious consideration of all the symptoms. In this case, should the affection of the heart be overlooked, the error is not one of the most serious kind, as the treatment for pleuritis or peripneumony is well adapted for pericarditis.

In a disease the treatment of which requires so much decision and promptitude in the practitioner as pericarditis, it is necessary for him to be thoroughly conversant, not only with the symptoms of deterioration, but also with those of amelioration. To these, therefore, we shall advert before proceeding to the physical signs.

If the worst symptoms decline, namely, the feeble, fluttering, unsteady pulse, the feeling of

* On it alone we have seen M. Chomel found a successful diagnosis in the last stage of a typhus fever, when the symptoms were extremely complex.

faintness and suffocation, and the constrained position to which that feeling confines the patient, we may be tolerably sure that the fluid, on which these symptoms commonly depend, is decreasing by absorption. But, notwithstanding, should pain, violent impulse, fever, and anxiety continue, the inflammation is in progress, and is adding to the accumulation of lymph, if not also of fluid. Should, however, the pain, instead of being fixed and pungent, become a diffuse uneasiness; should the anxiety decrease, and the peculiar vehemence of the heart's action gradually degenerate into the beat of a merely accelerated circulation, the inflammation may be presumed to be on the decline; but it is not until all these symptoms have completely ceased that it can safely be said to have terminated.

Still, lymph and adhesion of the pericardium may remain, rendering the reparation imperfect; and such we may consider to be the case so long as, with every advantage of perfect tranquillity and abstinence, the motions and sounds of the heart do not completely regain their natural standard. Even though this be regained, nothing is more common than a recurrence of palpitation and other symptoms of diseased heart when the patient resumes his accustomed avocations. It is not, therefore, until, very gradually returning to corporeal exercise, he finds himself, after an adequate trial, perfectly capable of his wonted exertions, that the cure can be pronounced complete.*

Physical Signs. — *The impulse* of the heart is greatly increased,—not only heaving the thoracic walls vigorously, but being remarkable for its abrupt or jerking character; whence it often shakes the whole anterior chest. Some beats are generally stronger than others, even when the action is regular. The pulse or rather throb of the arteries, often perceptible over the whole body, is of a corresponding nature, each undulation of the blood shooting with instantaneous velocity under the finger, as if through a lax or imperfectly filled tube, and constituting what is called a bounding, or, more expressively, a jerking pulse,—the pulse that we feel during reaction after uterine or other excessive hemorrhage. Very frequently it is accompanied with a distinct thrill. Sometimes it is stronger and more voluminous, at others smaller and weaker; yet in the latter case it still retains the same jerking character.

When the action of the heart becomes feeble and faltering, the impulse of the organ of course sustains a corresponding change; but, notwithstanding, the jerk accompanies any isolated contraction that happens to be strong.

An impulse and pulse of the jerking description denote an inordinately abrupt, and as it were spasmodic contraction of the heart, probably attributable to an increase of irritability resulting from the inflammation. It is this peculiarity in the beat which distinguishes it from the beat of a merely accelerated circulation, a distinction perfectly familiar to practical men. The peculiarity subsists not only during the continuance of inflammation, but so long as the action of the heart remains quick after the inflammation has apparently subsided,—a period which generally occupies several weeks, and, if adhesion of the pericardium has taken place, frequently as many months. We have known it exceed half a year. In very protracted cases it is probable that the irritability of the heart is kept up either by an occasional recurrence of inflammatory action, or by the unnatural circumstances in which the organ is placed by adhesion, or, finally, by a softened state of the muscular substance, the result of carditis.

The Sounds. — The sound of the ventricular systole is not unusually sonorous, but is accompanied with a bellows-murmur. This sign was first noticed by Dr. Latham, who pointed it out to us at St. Bartholomew's Hospital in 1826. Since that time we have never found it absent *when the heart presented the increased jerking impulse* above described. Dr. Latham restricts his observation to rheumatic pericarditis: to ourselves the phenomenon has appeared to exist equally in every form of the disease. When the action of the heart has been feeble and faltering, we have found the murmur absent; but when, in the same case, the action has, either previously or subsequently, been strong and jerking, the murmur has existed. The reason of this will be obvious from the explanation which will presently be offered. The murmur sometimes continues after the heart appears to have resumed its natural action and the patient to be well; but so long as it remains, as remarked by Dr. Latham, (Lond. Med. Gaz. vol. iii. p. 214) "his return to the habits and exertions of health will bring back palpitation and other symptoms, which bespeak the certainty of mischief still abiding in the heart.

Not the ventricular systole only, but occasionally, though by no means always, its diastole likewise is attended with the bellows-murmur; and we have found this supersede and as it were annihilate the natural second sound more completely in pericarditis, than, we think, in any other affection of the heart. Sometimes, in short, it is a pure whizzing, as prolonged as, and almost continued into, the first sound. Three cases at present under our care present this character.

What is the proximate cause, and what the mechanism of these preternatural murmurs? That of the ventricular systole we are inclined to attribute, mainly at least, to the increased velocity with which the blood is propelled in consequence of the morbidly abrupt contraction of the heart,—an explanation which appears to us to be rendered probable by the following considerations: 1. by repeated abstractions of blood, in animals, at intervals of a day or two, we have produced at pleasure, the rapid, throbbing, jerking, and thrilling action of the heart and arteries, and, in strict concomitance with it, the bellows-murmur; 2. the murmur takes place in nervous palpitation when the action of the heart and arteries is of the nature described; 3. the loudness of the murmur observes a very accurate ratio to the violence of the throbbing, and it subsides when the throbbing ceases, unless there remain an organic lesion, presently to be described, which generates it on a different principle.

But though we attribute the murmur of the ventricular systole *mainly* to the cause described,

* See an excellent paper by Dr. Latham, Lond. Med. Gaz. vol. iii. p. 213, to whom the profession in general, and ourselves in particular, are greatly indebted for his researches on this subject.

we believe that it may, in some instances, originate partly in another cause; namely, constriction of the arterial orifices consequent on inflammation of the lining membrane. For, as this membrane is more liable to inflammation where it constitutes the valves than elsewhere, it is consistent with analogy to suppose that, by its intumescence and loss of elasticity, the orifices will undergo the constriction alluded to.

The murmur accompanying the second sound we are inclined to attribute perhaps entirely to the same constriction, affecting the auriculo-ventricular orifices. This we infer, because we have not found it produced in any appreciable degree by abrupt, jerking action of the heart in reaction from loss of blood, and in nervous palpitation; and because, when we have noticed it in pericarditis, we have invariably found it connected with a more or less thickened and opaque state of the valves—a state which, though perhaps scarcely amounting in every instance to an obstruction when it was examined in the dead subject, gives sufficient reason to believe that it might have constituted one during the period of acute inflammation. Should this be found true, the bellows murmur of the second sound renders the prognosis more gloomy, as it bespeaks a more extensive inflammation, and the probability of subsequent valvular disease.

[It may admit of question, whether the bellows sound accompanying the contraction or dilatation or both is ever present in simple pericarditis. It probably, in all cases, indicates the co-existence of inflammation of the endocardium,—*endopericarditis.*

The first effect of inflammation of a serous membrane is to diminish, or totally arrest the secretion that takes place from it in health, — hence the sound of rubbing of two dry surfaces upon each other is an evidence of the early stage of pericarditis. A similar sound may, however, be produced by the friction of plastic lymph, which is often copiously exuded after the inflammation has continued for a time. This friction sound is equally heard during the contraction and dilatation of the ventricles, and has been termed the *to-and-fro* sound. This sound has been compared to the rustling of taffetas, bank-note paper, or parchment. When the effusion is considerable,—in addition to extensive dulness on percussion, the sounds of the heart seem to be distant, and, consequently, obscure. This secretion takes place at an early period of the disease, and is occasionally very considerable; the quantity of serum effused in the first three or four days amounting, at times, to ten or fifteen ounces. When the disease terminates in health, this is gradually absorbed. Occasionally, there is an evident tremour over the cardiac region.

Air, it is said, has been found along with the albuminous secretion, but this must be a rare occurrence. Where it exists alone—*pneumo-pericarditis*—it is said to be indicated by remarkable resonance on percussing the region of the heart, —a resonance, which is much greater than when a portion of emphysematous lung is between the chest and the heart. When air is associated with effused fluid, it may be detected by the sound of splashing or of fluctuation heard when the chest is shaken.]

Percussion.—When the pericardium contains much fluid, the resonance of the præcordial region becomes dull over a greater extent than natural. The impulse, also, it may be added, is undulatory, and not exactly coincident with the first sound, in consequence of the heart having to displace the fluid interposed between it and the thoracic walls, before it can impinge against the latter. (See Hydropericardium.) M. Louis states that he has found a temporary effusion of fluid cause a prominence of the cardiac region. We do not happen to have noticed this, but we think it very probable, especially in young subjects, in whom the cartilages are soft.

Signs and Diagnosis of Chronic Pericarditis.

General signs.—The signs of chronic pericarditis are much the same as those of acute, but in a very inferior degree. The fever is more that of hectic or marcor, with occasional exacerbation, when perhaps the inflammation becomes subacute. The anxiety and restlessness, though sometimes great, are comparatively supportable. The position is less constrained, and we have observed that the patient often prefers the sitting posture with the body inclined forwards. The circulation is less embarrassed, and the action of the heart, though often abrupt and jerking, is usually somewhat feeble, except during any temporary exacerbation of inflammatory action. The pulse, also, is sometimes not very unsteady though the pericardium be full of fluid; which we attribute to the elasticity of the membrane not being so far destroyed by the inflammation as to prevent it from gradually undergoing extension, and accommodating itself to its contents, whence compression of the heart by the fluid is in some degree obviated. The patient, we have thought, more frequently complains of a load and fulness, "something which he cannot get down," in the scrobiculus cordis, in chronic than in acute pericarditis.

Chronic pericarditis, especially if such from its commencement, is more obscure than acute. We have, in former years, seen it overlooked more than once. But these cases, when we now revert to them, appear to us to have presented sufficiently characteristic symptoms. The history affords the greatest light. If the patient, previously exempt from disease of the heart, has suddenly become affected with its symptoms, attended by marcor and some degree of fever, within a period seldom extending beyond a few months, and which he often dates from a blow or fall on the breast, a rheumatic fever, or an inflammation with pain in the præcordial region, chronic pericarditis may be strongly presumed; and if these symptoms coincide with the physical signs of fluid in the pericardium, the existence of the malady may be regarded as almost certain.

Physical signs.—The impulse and pulse have much the same general characters as in acute pericarditis, except that, as the heart's action is less vigorous, they are not so strong.* The signs of

* The sounds will vary according to circumstances. When the action of the heart is jerking, and not wholly devoid of force, the first sound will be attended with a murmur, which, however, is generally very slight. When

fluid in the pericardium are the same; namely, the extensive dulness on percussion and the undulatory impulse.

Causes, Prognosis, and Treatment of Pericarditis.

Causes of Pericarditis.—The most frequent causes are blows or excessive pressure on the præcordial region, inflammation propagated from the lungs or pleura, and, far above all, rheumatism. From this cause, children and young persons suffer much oftener than others. The remaining causes are those of inflammation in general, viz. cold, febrile excitement, &c.

[The disease may affect the fœtus in utero. In children that have died in less than forty-eight hours after birth, adhesions have been found between the pericardium and heart so strong as to lead to the belief that the disease had existed for some time prior to birth.]

Prognosis.—This disease, supposed by Corvisart to be necessarily fatal, has, by subsequent experience, been proved curable,—and completely curable; but as the possibility of effecting a complete cure is limited to a very brief period, and as, unless it be complete, the patient almost inevitably dies sooner or later from the consequences, the disease must be regarded as one of the most formidable incident to the human race. Some of these consequences we shall describe in the next section under the head of *adhesion of the pericardium*.

Treatment of acute Pericarditis.—The antiphlogistic treatment, in as energetic a form as circumstances will allow, should be employed with the utmost promptitude. The loss of a few hours at first may be irretrievable; and hence hesitation and indecision may seal the fate of the patient. If the attack be recent, and the patient's strength will admit, blood should in the first place be drawn freely and by a large incision from the arm, so as to bring him to the verge of syncope. From five-and-twenty to forty leeches, according to the strength, should then be applied to the præcordial region, so soon as the faintness from the venesection disappears, and reaction commences, which generally happens in the course of from ten minutes to an hour or two. Unless the pain be completely subdued by these measures, the leeching may be repeated two, three, or more times, according to the strength, at intervals of from eight to twelve hours; or, what is a better rule, so soon as the pulse and action of the heart denote a recommencement of reaction.

It is not, however, in every case that so active a treatment is required: we have seen a single prompt and abundant application of leeches, or a cupping, at once subduc every formidable symptom. When the patient, either from age, a feeble constitution, or the advanced state of the malady, cannot bear extensive depletion, local bleeding is, according to our observation, decidedly preferable to general; but it should be practised effectually, by cupping to twenty ounces or more, or by the application of from twenty-five to thirty or forty leeches. When, from depletion having already been carried to a great extent, or from the advanced stage of the disease, it is not safe to draw much more blood, yet it appears expedient from the persistence of pain, &c. to draw some, we have generally found that a smaller quantity drawn by cupping, produced more effect than a larger by leeching. The cause of this probably is, that by cupping it is drawn more expeditiously.

[Of late years it has been strenuously advised to bleed largely and repeatedly; and M. Bouillaud (*Nouvelles Recherches sur le Rheumatisme articulaire aigu en général*, &c. &c., 2d edit. Paris, 1830,) asserts, that he has, by this plan, rarely failed to cut short the disease, when he has been called early. He generally bleeds three or four times from the arm, to the amount of sixteen ounces each time, within the first three or four days, and employs leeching and cupping very freely. It is certainly good treatment to endeavour "to strangle" the inflammation at the onset by bloodletting; but if it should not succeed, when aided by the agents mentioned below, no time should be lost in having recourse to mercurial and other revellents. The safest course—even should the pulse be irregular and feeble, and the signs of general debility considerable—is to bleed, if the disease has been of short duration; but, on the other hand, as the writer has remarked elsewhere, (*Practice of Medicine*, 2d edit. i. 466,) the cupped and buffy appearance of the blood must not induce the practitioner to push the lancet too freely; for this, especially where the disease has a rheumatic origin, will commonly continue in spite of the bloodletting; and, it is affirmed, will even augment under its use.]

While the bleeding is in progress, other means should not be neglected. The intestinal canal, if at all confined, should immediately be evacuated by a purgative enema. Three drachms of senna leaves, and an ounce of sulphate of soda infused in a pint of boiling water and strained, answers the purpose. At the same time, five grains of calomel with five or ten of comp. extr. of colocynth, and two or three of extr. of hyoscyamus, should be given, and in two hours be followed by a senna draught.

The strength of the remedies employed must in each case be apportioned to the vigour of the patient's constitution; but the object is the same in all—expeditiously to prostrate the action of the heart, and for a time to keep it prostrate by preventing the re-establishment of reaction. If this object can be accomplished for the first twenty, thirty, or forty hours, the disease frequently does not rally, but remains perfectly under the control of remedies. We feel satisfied that a degree of activity in the first instance, which to some may appear excessive, is an ultimate source of economy to the strength of the patient; for the disease is subdued at once, and the protracted continuance of depletory measures, the most exhausting to the constitution, is rendered unnecessary.

In addition to the above measures, diluent cooling drinks, as four scruples of supertartrate, or two of nitrate of potass in a quart of water, and flavoured at pleasure, should be allowed in unlimited quantity, in order, by diluting the blood

there is inflammatory constriction of the orifices, a murmur will attend both sounds. Should the heart be dilated, as is frequently the case, the sounds will be increased; and should hypertrophy be conjoined with the dilatation, the impulse will sustain a corresponding augmentation of force

to render it less stimulant to the heart. Nauseating doses of tartrate of antimony, as one-sixth to one-eighth of a grain, every two hours, may be employed with advantage. [Or it may be given in contra-stimulant doses from 12 to 24 grains in the day, in divided doses, where the necessary tolerance exists. Colchicum often proves useful, and it has often been thought especially so when the disease is of rheumatic origin.] The diet should consist wholly of the weakest slops, as barley-water, gruel, weak tea, arrow-root, &c.

But the antiphlogistic treatment alone is not to be relied upon: rarely, if ever, does it, in a severe case, effect a complete cure. The practitioner sees all his resources gradually exhausted, while the disease proceeds with an even, uncontrolled tenor to its fatal termination. Sometimes, indeed, all the other symptoms disappear, but the action of the heart remains stronger than natural; at other times the heart even regains its healthy action, and the cure appears complete: yet in both these cases the palpitation, accompanied with symptoms of organic disease of the heart, recurs when the patient resumes his accustomed occupations. The reason of this is very intelligible. Unless the effused lymph, as well as the serum, be absorbed, it causes an adhesion of the pericardium, and thus establishes destructive disease. Now antiphlogistic measures can neither prevent the effusion of lymph, nor with any degree of certainty cause its absorption. Mercury *can* do this, as is visibly displayed in iritis; mercury, therefore, is the sheet-anchor of the practitioner. Dr. Latham is of opinion that its success is restricted to the condition of its producing salivation rapidly. From many observations we are satisfied of the general truth of this remark, and would therefore give the remedy on this principle; but we have seen cases in which cures, not falsified after many months, were effected, though salivation was not produced. The mineral, however, was freely administered, and probably produced its specific effect, though not in an apparent manner. From five to eight grains of calomel, or from ten to fifteen of blue pill, prevented from purging by a grain or a grain and a half of opium, three times a day, commencing after the first bleeding and a purgative, generally produce the effect with sufficient expedition. Inunction may be superadded or partially substituted, if mercury, taken internally, disagree. A manifest abatement of the symptoms generally takes place immediately on the effect of the remedy becoming apparent in the mouth, especially if a free salivation is established within the first thirty or forty hours. It should be maintained for a week or ten days, or even longer, unless the symptoms completely yield before the expiration of this period.

Should pain continue in the advanced stages of the malady, and after the period for applying leeches has passed, blisters may be resorted to, and repeated in quick succession, with great advantage. I have occasionally found a third or a fourth necessary before the pain has been completely removed. In the repetition of blisters, as well as of leeches, cupping, and venesection; and in the selection of one of these remedies in preference to another, much must necessarily be left to the judgment of the practitioner. It is only experience which can teach the exact adaptation of remedies to the circumstances. It must also be left to his discretion whether to give sedatives or not. When the restlessness and nervous irritability were great, we have seen much benefit derived from tinct. hyoscyami, *m*xv. ad xx. with the same quantity of tinct. digitalis, in a draught three or four times a day. Sedative remedies, however, should not be given until the first severity of the inflammation has subsided; nor should they ever be allowed, by producing their poisonous effects, to confuse the symptoms, already sufficiently complex, in the latter stages.

During convalescence it is sufficient to say that a very sparc unstimulating diet and extreme tranquillity must be imperatively enjoined, until the action of the heart has become perfectly and *permanently* natural.

An individual who has recently been affected with pericarditis is peculiarly liable to a recurrence of it, especially if it has resulted from rheumatism, and if the reparation has been incomplete. In this case, should rheumatism return, it rarely fails to be accompanied with a renovation of the pericarditic symptoms.

This cannot be a subject of surprise; for it is consistent with general analogy that a part recently injured by inflammation is more susceptible than a healthy tissue of inflammatory action; the reason of which probably is, that the vessels of newly organized adventitious structures are more tender and irritable than others. Secondary inflammation, however, has not the same energy and intensity as that of a healthy structure; it yields more promptly to curative measures, and is more completely within the powers of medicine. Hence a first attack of pericarditis is more dangerous than any subsequent one. It is comparatively rare for a patient to die from the direct effect of a recurrent attack; and, what is still more remarkable, he may sustain several without being left in a materially worse condition than after the first.

Much discretion, however, is requisite on the part of the practitioner to bring such recurrent attacks to a favourable termination; and the danger of doing too much is, perhaps, greater than that of doing too little. He must, in particular, be cautious of bleeding too extensively, with the object of reducing the excessive energy of the heart's action; for this energy, he must recollect, is a consequence not of the inflammation only, but partly also of an organic affection of the organ left by the primary attack. Nor is there the same motive for a vigorous employment of mercury; for the heart being already irreparably disorganized, it would be chimerical to entertain the expectation of effecting a *perfect* cure. The object, therefore, should be simply to prevent deterioration by combating the inflammation as it presents itself.

For the accomplishment of this object, a moderate use of bloodletting and mercury suffices; and leeching or cupping on the præcordial region is more efficacious and less exhausting than venesection. Blisters are, in these cases, peculiarly beneficial; and they may be repeated in quick succession as often as they are required and can be borne. When there still remains a little lingering pain, which scarcely authorises vigorous

measures, but cannot prudently be left, the most valuable and convenient remedy has appeared to us to be, a plaster composed of a scruple of tartrate of antimony, five scruples of the emplast. picis comp. and one scruple of wax to diminish the tenacity of the adhesion.

In these cases, also, where the sufferings of the patient, though perhaps not severe, are very protracted, and accompanied with much loss of rest, great advantage is derived from a pill of from three to six grains of extr. of hyoscyamus at bedtime, and moderate doses of tincture of digitalis during the day, the specific poisonous effect of the latter remedy being obviated by omitting it for a couple of days after every three or four.

Treatment of Chronic Pericarditis. — When pericarditis is essentially chronic, and the cavity appears to contain fluid, counter-irritant remedies are the most suitable. After what has already been said, it will be sufficient merely to mention blisters, either in succession or kept open with savine cerate, the tartrate of antimony and pitch plaster, and likewise issues and setons. The last remedy, however, generally creates so much irritation as to do more injury by deteriorating the general health, than good by its local effect. Mercury to a moderate extent may, if discreetly employed, be advantageous by promoting absorption; but in general the patient is too much reduced by constitutional irritation to admit of more than the mildest action of this remedy.

The diet may in chronic cases be more nutritious, comprising light animal food and broths.

II. Carditis.—Inflammation of the muscular substance of the heart may be, 1. universal, 2. partial.

1. Of universal carditis, with effusion of pus generally throughout the muscular tissue, there is not to our knowledge more than a single instance on record, and that occurred to Dr. Latham. "The whole heart," says he, "was deeply tinged with dark-coloured blood, and its substance softened; and here and there upon the section of both ventricles, innumerable small points of pus oozed from among the muscular fibres. This was the result of a most rapid and acute inflammation, in which death took place after an illness of only two days." (Lond. Med. Gaz., vol. iii. p. 118.) Laennec, never having met with or heard of a case of this kind, and considering an effusion of pus the only unquestionable sign of carditis, says, "there does not perhaps exist a single incontestable and well-described example of *general* inflammation of the heart, either acute or chronic." (De l'Auscult. t. ii. p. 554.) Independent of the above instance, however, there are probably many others, which, though not attended with effusion of pus, will come under the denomination of universal carditis; for few will concur with this distinguished writer in excluding from the proofs of carditis softening and induration, with increased or diminished colour of the organ. These are results of inflammation in other muscles, and analogy points out that they have the same origin in the heart. Further evidence is derived from the fact that, in cases of pericarditis, the characters in question sometimes occupy only a certain depth of the exterior surface of the organ, whence the presumption is almost positive that they originate in an extension of the inflammation from the pericardium. The cases of this description that are on record, are too numerous to be quoted. Several have fallen under our own observation. In this point of view, then, general carditis is not very rare.

As softening and induration are of sufficient importance to demand separate articles, we refer the reader to them for all that remains to be said on general carditis.

We have already stated, when treating of pericarditis, that this affection is greatly aggravated by the coexistence of carditis. As the treatment of the two is the same, it is unnecessary here to enlarge on it.

2. Partial carditis, characterized by the existence of an abscess or ulceration in the walls of the heart, is not very uncommon. Bonetus, in his Sepulchretum, has described a considerable number of cases. Abscesses are more rare than ulcers. The latter occur both on the external and the internal surface of the heart, and are consequent sometimes on inflammation of the membranes of those surfaces, and sometimes on steatomatous deposition in the cellular tissue beneath the lining membrane. The external ulcer is uncommon, but Olaüs Borrichus, Peyer, and Graetz have left perfect descriptions of it. The first says, "Cordis exterior caro, profundè exesa, in lacinias et villos carneos putrescentes abierat." The internal ulcer is more common. Bonetus, Morgagni and Senac present many cases. We have met with two or three.

An ulcer, whether external or internal, may perforate the heart.

The signs of abscesses and ulcers vary in different subjects, and are not distinguishable from those of other affections. "I know not," says Laennec, "if auscultation will afford any more sure signs, and I avow that I think not." (De l'Auscult. t. ii. p. 664.)

Ulceration is the most frequent cause of rupture of the heart,—fortunately a very rare occurrence.

The existence of gangrene of the heart has never been distinctly proved, and the following reasons lead to the belief that its occurrence is perhaps impossible: first, the muscular tissue is one of those least susceptible of it; and, secondly, inflammation of the heart sufficiently intense to occasion it, is fatal to the patient before gangrene can take place. The cases on record of reputed gangrene, appear to have been nothing more than softening, which incipient putrefaction had rendered more analogous to gangrene.

Adhesion of the Pericardium. — Pericarditis, both acute and chronic, and especially that originating in rheumatism, frequently terminates in adhesion of the pericardium. Lancisi, Vieussens, Meckel, Senac, and Corvisart, are of opinion that, with a complete and intimate adhesion, the patient cannot live in a state of health. We know not how it is that Laennec and Bertin have formed an opposite opinion. The former states that he had opened a great number of subjects so affected, who had never *complained* of any derangement in the circulation or respiration; whence he infers that adhesion often does not in any respect interfere with the exercise of those

functions. Our experience is entirely opposed to this doctrine. The *complaints* of the patient are, perhaps, not a just criterion, for we have often found the working classes disclaim dyspnœa when labouring under enormous hypertrophy and dilatation, and when that symptom obviously existed in a great degree. Many others, also, especially children, are naturally inattentive to their own sensations, and close interrogation is the only mode of ascertaining that after the attack of pericarditis they became incapable of some exercises, habits, or efforts, which they previously accomplished with facility.

We have never examined a case of complete adhesion of the pericardium without finding enlargement of the heart, — generally hypertrophy with dilatation. We have observed that cases of adhesion terminating in enlargement often hurry to their fatal conclusion with more rapidity than almost any other organic affection of the heart; and we have, on the other hand, repeatedly seen patients die from the consequences of an adhesion, the history of which we could trace back, eight, ten, or more years; yet such individuals would not unfrequently represent their health to have been perfect during the greater part of that period, and would not admit, until closely interrogated, that they had been more or less "short-winded." Hence we infer that, though adhesion may not for a time create much inconvenience, its effects are ultimately fatal. This refers, of course, to intimate, not to loose adhesion. It appears to us that a tranquil, abstemious life, by which in other forms of organic diseases of the heart existence may sometimes be prolonged to its natural period, cannot be equally availing here; for as the action of the organ itself is a constant struggle, repose is impossible.

How adhesion occasions hypertrophy is easily understood; for the organ must increase its contractile energy, in order to contend against the obstacle which the adhesion, by shackling its movements, presents to the due discharge of its function, and, as explained in the article Hypertrophy, increased action leads to increase of nutrition. The cause of the coexistent dilatation is not less manifest; as the shackled organ transmits its contents with difficulty, in a state of greater congestion than natural, and, as is more fully explained in the article on dilatation, permanent distension is the most effective cause of this affection. When the muscular substance is softened, as frequently happens, dilatation takes place much more readily, in consequence of the deficient elasticity or tone of the heart's parietes.

When adhesion of the pericardium has produced hypertrophy with dilatation, its history identifies itself with that of the latter maladies, of which it renders the symptoms more severe and the progress more rapid. To avoid repetition, therefore, we refer the reader to the article Hypertrophy, and shall, here, only describe the signs which are pathognomonic of adhesion.

These signs have generally been considered very obscure. Dr. Sanders believed that he had discovered one of a positive nature in a dimple or retraction taking place, as he states, during the ventricular systole, in the epigastrium immediately below the left false ribs. We have searched for this attentively in several cases of adhesion, but have not been able to detect it in any degree which could constitute a sign. Laennec, who was equally unsuccessful, thinks that it could not take place unless the stomach, by adhering both to the diaphragm and the abdominal parietes, formed the medium of retraction.

In five or six cases we have remarked one sign, which has not, to our knowledge, been hitherto noticed; namely, the heart, though enlarged, beats as high in the chest as natural, and sometimes occasions a prominence of the cartilages of the left præcordial ribs. We should, indeed, naturally expect that the adhesion would brace up the organ, and that, when enlarged and not able to descend, it must, being bounded behind by the spine, force the walls of the præcordial region forward.

Another sign, and perhaps the most characteristic of all, is an abrupt, jogging, or tumbling motion of the heart, very perceptible in the præcordial region with the cylinder. It is more distinct when the heart is hypertrophous and dilated; and under these circumstances we have found the jogs correspond with the ventricular systole and diastole respectively, that of the diastole being sometimes nearly as strong as the other, and having the character of a receding motion. This jogging motion is distinguished from the undulatory movement of fluid in the pericardium, both by its nature, by the synchronism of the jogs with the sounds, and by the feeling that the heart at each systole comes in immediate contact with the thoracic walls.

A third sign consists in a bellows-murmur with the first sound, which we have always found present when the heart is enlarged and acting vigorously. Nor is it, in every case, confined to the heart: we have often heard it in the aorta, and formerly experienced difficulty in discriminating it from the murmur of dilatation of this vessel. (Vide Treatise, by Dr. Hope, p. 63.) Although, when the heart is dilated, the murmur in question may be occasioned partly by the relative smallness of the orifices, and the greater angles at which the currents meet in them in consequence of the unusually rounded form of the ventricles, as elsewhere explained, it is also, we believe, occasioned in a great measure by the sudden velocity with which the fluid is propelled, as it would not otherwise exist in the aorta.

J. Hope.

PERICARDIUM, DROPSY OF. See Hydropericardium.

PERITONITIS, from *περιτόνειον*, *peritonæum* —This is the term now universally used to express an inflammatory state of the serous membrane which lines the interior of the abdominal cavity, and invests all the viscera contained therein.

Pain, tumefaction, and tenderness of the abdomen on pressure, are the most prominent symptoms which characterize this affection during life; and increased vascularity, thickening, effusions of coagulable lymph, of serum, of pus, or blood, are the principal local effects produced by it. These elementary features, accompanied in general with more or less of pyrexia, will exist in different de-

grees and combinations, in every variety of age, sex, or constitution, modified, however, by circumstances derived partly from the nature of the cause, and partly from the condition of the patient at the time of the attack.

Peritonitis may assume either the acute or chronic form. It may exist as a sporadic disease, or prevail as an epidemic. It may either present itself openly, with a numerous group of well-marked symptoms, or creep on in a latent state, with scarcely one of its characteristic features. It may be limited in its extent to a small portion of membrane, or spread over a large surface. It may run its course uncombined with any other affection, or be complicated with various diseases. There is no period of life exempt from its attacks. It may affect the infant, the adult, and the puerperal female: pursuing the same course, and exhibiting similar effects in all, it yet presents a vast variety of symptoms in individual cases, principally according to the organ whose peritoneal covering is the chief seat of the inflammation.

Pure peritonitis is exclusively confined to the peritoneum, without involving the muscular or mucous tissues of the intestines, and can in most cases be distinguished by peculiar symptoms from inflammatory affections of those tissues. Not uncommonly, however, inflammation commencing in one tissue extends to those contiguous; but this is by no means uniformly the case; frequently the very opposite effect is induced in this disease, and the intestinal mucous membrane becomes remarkably pale, while the peritoneum is acutely inflamed.

We shall proceed, in the first place, to notice the disease as it exists in the acute form in the different periods of life.

I. Acute Peritonitis in the Infant.—This disease may attack the infant during its intra-uterine life. Its exciting causes during this period of existence are obscure: they may possibly be transmitted from the mother to the infant, or originate from an internal strangulation of the intestines, of which M. Legoues and M. Ducis have seen examples. However difficult it may be to assign a satisfactory cause for its origin, its existence has been unequivocally demonstrated by the post-mortem appearances which infants who have died a few hours after birth have exhibited. In some cases of this kind, the usual effects of peritoneal inflammations, adhesions between the intestines, false membranes, and sero-purulent effusions into the abdomen, have been detected—effects which must have been produced during the abode of the infant in utero. Five cases of infants who died a few hours after birth have been detailed by M. Billard, in which the above appearances were found. In one instance the child was emaciated and pale; and old, solid adhesions were discovered in the abdomen, apparently indicating that the disease had existed for some time previous to birth, and had probably become chronic before it terminated fatally. In the other four cases, the infants presented nothing unusual in their external appearance.

The causes which may excite peritonitis during the period of lactation are not very evident. They probably are essentially the same as may operate during adult years. Infants are exposed, to a certain extent, to similar injurious impressions from external agents, and their organs are at least equally susceptible of morbid actions.

Symptoms.—The abdomen of the child presents a tumefied and tense appearance, and is elevated in a point towards the umbilicus. This distension is caused in the early period of the disease by flatus in the intestines: it is accompanied by some dyspnœa, which does not, however, always indicate a pulmonic affection, but is produced by the obstruction which the diaphragm suffers in its descent from the distended abdomen, and the pain which its movements occasion by the friction of the inflamed peritoneal surfaces against each other. There is constant abdominal pain, which is much aggravated by pressure. The countenance exhibits an expression of suffering: the features are contracted, and the little patient cries almost without intermission. Vomiting usually is present, and the bowels are in most cases constipated. There is restlessness, with general debility; hot, dry skin, and frequent, weak pulse; and, if prolonged into the chronic state, the child becomes emaciated, and dies exhausted.

It is difficult to distinguish this disease from infantile enteritis, with which it is occasionally complicated. In its simple form it is usually attended with more abdominal tenderness on pressure. Constipation generally exists in peritonitis, while diarrhœa is frequently an attendant on inflammation of the mucous membrane. The appearance of the tongue may assist in the diagnosis, being, in the latter affection, generally furred with red tip and edges, and red papillæ, while in simple peritonitis this redness is not generally present. Peritonitis is a much less frequent disease during infancy, not being so likely to be induced by irregularities of diet and the other injurious agents to which children are particularly exposed, and which are common exciting causes of enteritis. M. Billard observes that it may be distinguished from pleuritis by the sonorousness of the chest, and from flatulent colic by the pains being remitted in the latter affection, and ceasing on the expulsion of gas. (Maladies des Enfans, Paris, 1828, p. 449.) The prognosis in this disease is generally unfavourable. The post-mortem appearances do not differ from those which the disease presents in adults, and which will be hereafter described.

Children of a scrofulous habit are subject to a form of chronic peritonitis, which deserves distinct notice: it is characterized during life by great tenderness of the abdomen on pressure, with occasional paroxysms of acute pain, at first coming on only once or twice a day, but afterwards becoming more frequent, after which the child appears quite lively, and free from indisposition. At first the pain is limited, but afterwards extends over the whole abdomen, which in the early stages becomes swollen and tense, but afterwards subsides: the pulse is generally about 100, with some strength and fulness, the tongue clean, appetite irregular, but generally good, and frequently voracious; some thirst, the bowels free, the evacuations unusually large in quantity, and peculiar in appearance, consisting generally of a whitish-brown matter, of the consistence of a thin pudding. This state of the bowels may continue for six weeks or

two months with progressive emaciation, until diarrhœa, attended with petechiæ, puts a period to the child's life. The head seldom suffers, but cough and dyspnœa occasionally attend. The usual duration of the disease is four or five months, but often the child is not confined to his bed till the last month. Dissection exhibits the mesentery, bowels, and peritoneum lining the parietes, united together into one mass; the peritoneum thickened, and containing large masses of scrofulous matter; the intestinal mucous membrane perforated by ulcerations, which form numerous communications between the different coils of intestine; and the intestines and abdominal cavity containing matter resembling that which was passed during life by stone. The causes of this disease are unknown, and it in general terminates fatally. Dr. Gregory recommends leeches and fomentations during the early stages, afterwards purgatives, mercurial alteratives, tonics, chalybeates, and absorbents. Laudanum affords the only relief from the pain. This disease appears to be a frequent cause of infantile marasmus. (Medico-Chirurg. Trans. vol. xi. p. 262. Dr. Gregory on Scrofulous Inflammation of the Peritoneum.)

II. *Acute Peritonitis in the Adult.*—The causes which predispose to peritonitis in mature years are involved in some obscurity. They probably do not differ essentially from those which predispose to other inflammations. It is observed to be more common during adult years than at other periods of life; in women than in men; and in sanguine and plethoric individuals than in the opposite constitutions. A disposition to local determinations of blood, proved by previous inflammatory attacks and repeated discharges of fluids, is, according to Broussais, a common predisposing cause, and to this may be added cold seasons of the year, residence in damp situations, the abuse of intoxicating liquors, and over-excitement of the passions.

The exciting causes may be arranged in three classes—the *mechanical*, the *chemical*, and the *vital*.

The *mechanical* causes include all injuries inflicted on the abdomen by blows, falls, or compression, pressure of the gravid uterus, extra-uterine conceptions, enlarged ovaries, or other morbid growths within the abdomen. Under this class may also be included all wounds of the peritoneum, whether the result of accident, surgical operations, or strangulation arising from hernial protrusions, or invagination of a portion of intestine. M. Broussais considers violent and long-continued corporeal exertions, violent and repeated contractions of the abdominal muscles in vomiting, strictures of the colon or rectum producing unnatural contortion, and friction of the intestines on one another, as causes of peritoneal inflammation.

The *chemical* causes include all extravasations into the peritoneal cavity not quickly absorbed, whether of blood, urine, bile, chyle, or fæces, and perhaps the morbid serous secretions of the membrane itself.

The *vital* causes comprehend all aberrations of healthy actions, transmission of morbid action from a part previously affected to the peritoneum, or extension of inflammation from a contiguous organ or tissue to this membrane.

An aberration of action takes place when certain functions of the system are interrupted, as when the perspiration, the catamenia, or the lochia are suppressed, and peritonitis is induced as a consequence. The remote cause in these cases arises from the operation of cold, moisture, or both combined, applied to the surface, or the drinking of cold liquids when the body is over-heated. Transmission of morbid action or metastasis may be ranked among the exciting causes. We see examples of this when the retrocession of rheumatic, arthritic, erysipelatous, or other inflammations, is quickly followed by an inflammation of this membrane. According to M. Broussais, the chill of an intermittent, when the abdominal viscera, and especially the spleen, are suddenly swelled by the centripetal motions of the fluids, may prove an exciting cause of peritonitis, examples of which he has frequently seen during the course of these diseases.

Extension of inflammation from a contiguous texture or organ to the peritoneum, is a very frequent cause of this affection. Thus, when the gastro-intestinal mucous membrane is inflamed, the inflammation may extend itself to the serous envelope of the intestines; or when the uterus or any other of the abdominal viscera are similarly affected, the inflammatory action may be propagated to their peritoneal coverings, and the two diseases may either coexist, or a revulsion of the phlogosis takes place, the primary affection subsides, and simple peritonitis is established. This subject, however, will be more fully considered when we come to treat of the complications of this disease.

Symptoms of Acute Peritonitis.—This affection frequently commences by a shivering more or less prolonged, accompanied by a feeling of general indisposition and weariness in the limbs: at an uncertain period, reaction takes place, and heat of skin more or less pungent, with headach, constriction at the epigastric region, and frequent, hard, concentrated pulse, succeed, attended with a sensation of heat and pain in the abdomen, and tenderness on pressure. This pain soon becomes the principal symptom of the disease, and is not unfrequently the first which appears, not being preceded by any general febrile symptoms: it is usually of an acute, tensive, pungent character, and has been compared by some patients to the sensation which a cutting instrument or a screw introduced into the affected parts would produce. It varies much in its permanency, seat, and degree: in some cases the pain comes on in paroxysms, which continue for a short time, and then pass off, leaving in the intervals only an acute tenderness. "These accessions," says Abercrombie, "seem to be excited chiefly by flatus moving through the bowels and distending the inflamed part, and the action of a purgative is often followed by a violent aggravation of all the symptoms." (Abercrombie on Diseases of the Stomach, &c. p. 151.) In other instances the pain is permanent, and is confined to a single spot of small extent, in which it continues to preserve its intensity during the whole course of the disease: in other cases, again, the pain shifts from one part of the abdomen to another, and sometimes extends nearly over the whole membrane. The pain differs much in its degree, and may even sometimes be altogether absent, or

only felt on pressure: in other instances it is very severe, and much increased by the erect posture, or any motion of the body; hence the patient lies constantly on the back, and cannot, without an increase of suffering, lean to either side, finding most relief from remaining motionless, with the knees in a slight degree elevated. This position, while it throws the weight of the intestines on the spine, and therefore removes pressure from the inflamed membrane, at the same time relaxes the abdominal muscles, and prevents any stricture on the anterior surface of the inflamed parts. The respiration is frequent, small, and interrupted, and chiefly performed by the thoracic muscles, the depression of the diaphragm producing on the affected parts the same effect that pressure does on the abdomen; consequently, full inspiration, coughing, sneezing, vomiting, or the evacuation of the urine or fæces, aggravate the pain.

The increased sensibility of the abdomen is sometimes not perceived unless when pressure is made; but in other cases the soreness is so exquisite, that the slightest weight on the abdominal parietes aggravates it to an intolerable degree. The pressure of the bed coverings becomes insupportable, so that it is found necessary to keep them from being in contact with the abdomen by artificial means. This sensibility to pressure is the grand criterion by which we are to judge of the existence and degree of the disease; "and this," it has been observed, "we are not to estimate solely by the complaint, but by the countenance also of the patient. Even gentle pressure causes a sudden retraction of the lips and expression of pain, as if he were pierced by a sharp instrument. On the other hand, we are not to overrate the tenderness (though it is the surest diagnostic) by the wincing of the patient, especially if very irritable or young, or afraid of being hurt, or if the bowels happen to be uneasy and distended with flatus at the time."*

In addition to pain and tenderness on pressure, tension and tumefaction of the abdomen are constant and characteristic symptoms of peritonitis: those in the early stages arise from a tympanitic distension of the intestines, though at a later period of the affection they may be caused by effusion of fluid into the peritoneal cavity. This swelling, which is equal and regular in general peritonitis, exists in different degrees in different individuals, depending partly on the intensity of the inflammation, and partly on the degree of resistance which is offered by the abdominal parietes. It is considerable with those whose belly is naturally flabby, or when the abdomen has been recently distended, as in females after parturition, and in both sexes after the operation of paracentesis. In individuals, on the contrary, with strong abdominal muscles, and particularly in thin robust men, the abdomen is scarcely at all swelled; sometimes it is evidently retracted, especially in the first days of the attack; in such cases it is very hard, and in general the hardness and tumefaction are in the inverse ratio of each other. (*Chomel*, Dict. de Médecine.)

Along with these symptoms there are frequently present, singultus, nausea, and vomiting, the matter ejected being at first the contents of the stomach at the time of the attack, afterwards mucus or bile. The bowels are in general obstinately costive, though occasionally relaxed. The pulse, as the disease advances, is in general very frequent, ranging from 120 to 130 in the minute; it is also very small, as if not only the heart but the artery at the wrist had contracted upon itself; yet if it be accurately examined, it will be found, during the stage of excitement, firmer than natural, almost feeling like a small whip-cord or harp-string. The tongue is covered with a whitish fur, the urine is scanty and high-coloured, and there is excessive thirst, which the patient fears to gratify, in consequence of the vomiting which the introduction of fluids into the stomach often induces. (*Armstrong*, Morbid Anatomy of the Bowels, p. 92.)

The course of acute peritonitis is in general rapid, and marked by a progressive increase of all the above symptoms: the abdominal pain, tenderness, and tumefaction become aggravated, the face more pale, the features contracted, and often covered with a cold sweat,† the pulse more frequent, and anxiety augmented. The malady may remain stationary for some days with nocturnal paroxysms, either marked by a febrile exacerbation or an aggravation of the local symptoms, and may not terminate fatally till after thirty or forty days; but in most instances it runs a much more rapid course, and in some cases the patient sinks in sixteen to twenty-four hours from the commencement of the attack.

The approach of death is marked by cessation of the pain, by the pulse becoming quicker, smaller, and very weak, feeling like a soft undulating line; by coldness of the extremities, and ultimately of the entire surface of the body. The abdomen becomes more tumid and tense, but in some instances soft and relaxed; the face is sunk, and especially hollow round the orbits; the vomiting is succeeded by regurgitation of the liquid contents of the stomach without any apparent effort; and although the intellectual faculties are often preserved unimpaired to the last moment, sometimes delirium, a comatose state, or in other instances convulsive movements of the head or limbs, precede the fatal termination.

* *Dr. Dickson:* see Lond. Med. Chirurg. Rev. Sept. 1820. In order to form an accurate idea of the sensibility of the abdomen, the hand should be laid flat on its centre, and then passed successively on every part of it, the physician observing at the same time the patient's countenance, which will at once indicate pain if the abdomen be sensible. Care should be taken not to make pressure with the ends of the fingers; for then, by being applied to one point, it becomes considerable, and will excite pain where there may be no disease. (Martinet's Pathology, translated by Quain, third edit. p. 68.)

In some subjects the thickness of the muscles and parietes of the abdomen renders the pain on pressure scarce perceptible. In such cases M. Broussais directs us to make lateral pressure towards the centre of the abdomen. "Elle (douleur) était plus difficile à supporter quand on la faisait (pression) latéralement en la dirigeant vers le centre. Ce signe est un des meilleurs pour faire découvrir les péritonites obscures." (Histoire des Phlegmasies, vol. ii. p. 492.)

† The French pathologists have given a peculiar term to the expression of the countenance in this disease, "face grippée." Slight contractions of the muscles of the face, and principally of the forehead, are caused by the force of the abdominal pains, by which the features are discomposed and appear drawn up towards the forehead, which is wrinkled and the nose pointed. (See *M. Gasc.* Dict. des Sciences Médicales, article Péritonite. *Roche et Sanson*, Elémens de Pathologie, tom. i. p. 585.)

Such is the assemblage of symptoms which acute peritonitis, in its simple and open form, presents: they are not, of course, all present in every individual case, but the greater number of them will be generally found to cocxist in well-marked instances of the disease. Cases, however, occasionally occur, in which nearly all the above symptoms are absent. This variety of the affection will be considered under a distinct head.

Acute peritonitis may terminate by resolution; by effusion; by gangrene; or it may assume the chronic form.

Resolution may take place between the fifth and twentieth day. It is indicated by a cessation of pain, fever, and other inflammatory symptoms, a re-establishment of the functions of the neighbouring organs, the capability of turning on the side, and of bearing pressure on the abdomen, disappearance of the nausea and vomiting, and sometimes by the appearance of a critical evacuation, such as diarrhœa, abundant urine, and copious perspiration; by the pulse becoming slow and soft, and by the return of quiet and refreshing sleep.

Effusion is a frequent termination in fatal cases. The fluid effused may be serum, pus, or in some rare instances blood. These fluids may either exist singly or in combination with each other, or with coagulable lymph. The symptoms which denote effusion are diminution of the abdominal pain, with sense of weight and oppression in the affected part, irregular chills, softness of the pulse, paleness of the countenance, and coldness of the extremities. (*M. Gasc*, Dict. des Sciences Médicales.) Effusion may be ascertained to exist in many instances by percussion, which, when made on the abdomen in the early stages of peritonitis, generally elicits a sonorous sound derived from the tympanitic state of the intestines; but, as the effusion increases, this sound becomes progressively more limited and obscure. Fluctuation can also occasionally be felt,* but in general only after the disease has existed some time; for, as Andral observes, during the early periods of the disease, the abdominal effusion, small in quantity, is rather to be discovered by the tension, resistance, and modification of form of the belly, than by the great increase of its volume or the existence of fluctuation. (Clinique Médicale, Maladies de l'Abdomen, p. 539.) Fluctuation may also be absent, if the effused fluid is contained in a number of distinct abscesses, separated from each other by partitions of false membrane, of which the same pathologist relates an instance. (Ibid. p. 598.)

It is doubtful, when pus and lymph are effused in any great quantity, if they are ever absorbed, and such cases generally terminate fatally, or pass into the chronic form of the disease. However, M. Gasc asserts that he has known patients recover in whom the purulent matter escaped by the umbilicus, (Dict. des Sciences Médicales, p. 508); and we have seen cases of ascites consequent on peritonitis cured by the aid of medicine.

[Auscultation may afford evidences of peritonitis before and after effusion has taken place. As in the inflammations of serous membranes, the first effect is to arrest the secretions, so that the membranes are dry; and careful auscultation has detected a sound of *frottement* or friction. (Barth et Roger, *Traité d'Auscultation*, Paris, 1841.) The effusion of coagulable lymph may be detected by like signs, as well as by the hand applied over the abdomen. In a case of peritonitis supervening on ovarian dropsy, described by Dr. Beatty, when the hand was applied over the umbilicus and its neighbourhood, the sensation communicated to it, when a full inspiration was taken, was that of a grating or rubbing together of two uneven and rather dry surfaces. By the aid of the stethoscope, a loud and distinct friction sound was audible over a space about five inches in diameter, with the umbilicus for a centre. Another pathologist, Dr. Bright, states that he has observed, on several occasions, that when the circumstances of the disease had rendered it probable that adhesion had taken place between the viscera and the peritoneum of the abdomen, a very peculiar sensation was communicated to the touch, varying between the crepitation produced by emphysema, and the sensation derived from bending new leather in the hand. It has been presumed by Dr. Corrigan that for the production of this sign, the effused lymph must be in an unorganized condition; and also by Dr. Beatty, that it is observed only in cases where one at least of the opposed surfaces is adherent to a solid resisting body; and it would appear from Dr. Stokes, that in twelve collected cases, nine presented an organic tumour.]

Gangrene is a much rarer termination; but M. Gasc observes that, of all serous inflammations, peritonitis, when intense, is most disposed to pass into a state of gangrene. The symptoms indicative of this termination are, sudden cessation of the abdominal pain, smallness of the pulse, which becomes concentrated and intermitting, extreme prostration of strength, Hippocratic countenance, and speedy death. Dr. Abercrombie considers this termination rare, and that it is not often found in *post-mortem* examination as a prominent appearance, but when met with is slight and partial, and always accompanied with extensive deposition of false membrane. It more frequently occurs when enteritis coexists with inflammation of the peritoneum.

When acute peritonitis does not prove fatal in the course of fifteen or twenty days, it generally subsides into the chronic form. It sometimes, however, continues acute for a much longer period, and has even been protracted, as already mentioned, to thirty or forty days, and proved fatal at the end of that period. The symptoms which indicate this form of the disease will be considered in a separate section.

Diagnosis.—This is frequently attended with considerable difficulty, as the inflammatory affections of the viscera and other parts which the peritoneum covers frequently present nearly similar symptoms as inflammation of this membrane. Neuralgia and rheumatic pains of the adjacent muscles and nerves may also occasionally be mistaken for peritonitis; and colic, the passage of calculi along the biliary ducts or ureters, have been considered by some writers as liable to be confounded with inflammation of the peritoneum.

* For the mode of examining the abdomen, see article Abdomen, Exploration of.

In gastritis the pain and tenderness on pressure are confined to the region of the stomach; the vomiting in general is more urgent, and is more easily excited by food or drink, and the thirst, with desire of cold liquids, is more intense. The state of the tongue varies in gastritis; but when it does present the thick coat on the centre, and intense redness of tip and edges, it will assist us in the diagnosis, as this appearance is not observed in simple peritonitis. When the peritoneal coat of the stomach is inflamed, the diagnosis will be more difficult, and can only be established by an attentive consideration of the general history and characters of the two diseases which have been already detailed.—See Gastritis.

We have frequent occasion to discriminate between enteritis and peritonitis in practice, and the symptoms are often so very similar that some physicians have thought a diagnosis between them impracticable. Dr. Cullen, after having given peritonitis a distinct place in his nosology, tells us, in his First Lines, that it is difficult to say by what symptoms it may be known, and that when known it does not require any remedies beside those of inflammation in general, and gives this as a reason for passing it over without further description. Dr. Philip Wilson, in his work on Febrile Diseases, asserts, "that peritonitis seldom exists without the inflammation spreading in a greater or less degree to the stomach and intestines, nor does inflammation of the latter frequently exist without extending to the peritoneum. There is hardly room, therefore, for regarding peritonitis as a distinct complaint." Nevertheless, the two diseases are essentially different, as well in the texture affected as in several of their symptoms, and in the *post-mortem* appearances which they present; and they can in many, perhaps in most, instances be discriminated. The treatment of peritonitis ought also, in some degree, to vary from that of enteritis.

John Hunter was fully aware of the distinct nature of these two affections, for he observes, "If the peritoneum which lines the cavity of the abdomen inflames, its inflammation does not affect the parietes of the abdomen; or if the peritoneum covering any of the viscera is inflamed, it does not affect the viscera. Thus the peritoneum shall be universally inflamed, as in the puerperal fever, yet the parietes of the abdomen and the proper coats of the intestines shall not be affected; on the other hand, if the parietes of the abdomen or the proper coats of the intestines are inflamed, the peritoneum shall not be affected." (On the Blood &c. p. 244.)

The most important diagnostic symptom between peritonitis and enteritis is the sensibility of the abdomen to pressure; in the former, pain is excited by a very slight degree of pressure, which would produce little or no inconvenience in the latter. The action of the diaphragm in full inspiration or coughing does not produce so much suffering in enteritis, nor is it so much aggravated by motion of the body or abdominal muscles. The pain appears much more superficial in peritonitis, and in many instances is not accompanied with sickness or any other disturbance of the intestinal canal. The pain in peritonitis in general is of a more acute character, and is more frequently accompanied with constipation. Enteritis presents some peculiarities according as it affects different portions of intestine, and the presence or absence of which will assist our diagnosis; these have been already fully considered. (See Enteritis.) When the duodenum is inflamed, pain in the situation of that viscus, and occasionally jaundice, are present. In inflammation of the large intestines, there are generally diarrhœa or symptoms of dysentery, neither of which affections are common in simple peritonitis; but when the jejunum or ileum is inflamed, it is more difficult to discriminate; the pain in such cases is in general not so severe as in peritonitis, and is principally in the regions which those intestines occupy.

Rheumatism sometimes, though rarely, affects the abdominal muscles, and may be mistaken for peritonitis, as it presents the same pain on pressure or motion; but the pain in such cases is principally felt at the origin or insertion of the muscles, shooting to the false ribs and the spine of the ileum. (See Parr's Medical Dictionary, vol. ii. p. 21.) In such cases the skin may be greatly distended, and if the muscles are swelled, the figure of each is often preserved. The existence of these peculiar symptoms, conjoined with the absence of uniform tumefaction, vomiting, or constipation, will probably in most cases enable us to form a correct diagnosis. Neuralgic pains of the abdominal viscera or parietes may simulate peritonitis. Andral observes (Clinique Médicale, tom. iv. p. 539,) that rheumatic patients are sometimes attacked with severe acute pains in the abdomen, which vanish more or less suddenly without leaving any trace of a severe affection; and M. Chomel states that in several cases acute pains suddenly occur in the abdomen, often without any appreciable cause, and last for ten or twelve hours, with frequent pulse, nausea, and vomiting, and yield to the use of opium. (Dict. de Médecine, tom. xvi. p. 330.) There is some reason to suspect that these pains may in certain cases originate from irritation of some portion of the spinal cord, or of the ganglionic nerves that are distributed to the different viscera.* Their fugitive characters, the absence of pyrexia or tumefaction, and the general history of the case, may enable us to ascertain their real nature. In doubtful cases we should examine attentively the spinal column, and if any tenderness or pain is evident in a particular spot, it will give an additional probability to our suspicions.

Hysteria frequently simulates peritonitis, and nothing but a careful consideration of the history of the case and watching closely its progress, can enable us to discriminate between them. In hysteric cases, as Dr. Bright well observes, in general some great incongruity of symptoms will be detected: a tenderness of the abdomen, indicating inflammatory action beyond any thing which the pulse or the condition of the tongue would authorize us to infer; a hurry and even labour of respiration, more marked than in the embarrassed breathing of peritoneal inflammation; a sudden subsidence of the symptoms, and their sudden

* See *Whatton*, On Spinal Irritation, North of England Med. and Surg. Journal, *Dr. Corrigan*, Lancet, and Lond. Med. Chir. Review, July 1831, p. 182. *Teale*, on Neuralgic Diseases.

return; a shifting and changing of the tender or painful part, and sometimes the decided intervention of hysteric symptoms, and the very frequent accompaniment of some evidence of mental causes, or of irritation and deranged function in the uterus itself,—all these, together with the general aspect of the individual, will frequently be guides and indications to assist us. (Bright's Reports of Medical Cases, p. 453.)

Colic may be distinguished from peritonitis by the absence of fever, the pain being relieved by pressure, the state of the pulse, and the suddenness of the attack. (See Colic.) There are several other affections which occasionally may present some of the symptoms of peritonitis which would lead us into too long a detail to consider. We have endeavoured to select those only which either occur most frequently or present the greatest difficulty in diagnosis. Inflammation of any of the abdominal viscera, or the passage of calculi through the biliary ducts or ureters, may occasionally resemble peritonitis, though they in general possess sufficiently distinctive characters. (See the different articles that treat of these affections.)

Prognosis. — Peritonitis is always attended with considerable danger, but if subjected to active treatment at an early period there is a fair chance of effecting a cure, especially if the patient is not advanced in years, is of a good unimpaired constitution, and capable of bearing depletion to a considerable degree; or if the inflammation be limited in its extent and uncomplicated in its form, and the symptoms much mitigated by the evacuations employed. A favourable termination is indicated by the gradual diminution of abdominal pain, tension, and tenderness, the pulse becoming fuller, softer, and less frequent; the skin less parched, soft, and moist; the respiration less laborious, and the countenance more open and expressive of ease. An unfavourable result is to be expected when the patient is of advanced age, and of a debilitated or broken down constitution; when the disease originates from perforation of the stomach or intestines, or rupture of any of the abdominal viscera, or when it succeeds to a wound, a surgical operation, or to parturition; or extends over a large portion of peritoneal surface, or is complicated with an affection of any important organ. The danger is also greater when the inflammation has existed some time before the employment of remedies, and when the symptoms exhibit considerable intensity, and do not yield to the depletions employed.

Complications.—The fever which accompanies peritonitis may present either an inflammatory, typhoid, or gastric character. The former is met with most frequently in robust and vigorous patients; typhoid symptoms for the most part prevail in old persons of debilitated constitutions; and gastric fever will coexist when the gastro-intestinal mucous membrane is in a state of inflammatory excitement. The symptomatic fever may be so modified by the state of the patient at the time of the attack, by the coexistence of other morbid actions, and the prevailing epidemics of the season, as to present a variety of intermediate grades. In some instances peritonitis has been complicated with an intermittent fever, disappearing during the intervals, and re-appearing on the accession of each paroxysm. (*Andral*, Clinique Médicale, tom. iv. p. 571.) In some instances it has assumed a tertian or quartan type; (*Roche et Sanson*, Elémens de Pathologie, tom. i. p. 591); but such cases are rare. Andral relates an instance of peritonitis supervening on the disappearance of rheumatism; but it is most frequently complicated with affections of the abdominal viscera, especially of the stomach or intestines; the inflammation spreading from the peritoneum to the other contiguous tissues which form their parietes, or pursuing an opposite course, attacking primarily their mucous membrane, and afterwards penetrating to and affecting the peritoneum. It appears sometimes to coexist with an hepatic affection, and Chomel mentions a form of peritonitis called *bilious*, in which the peculiar symptoms of peritonitis were accompanied with a yellow coating of the tongue, discharges of bile from the stomach and intestines, with a yellowish tinge and pungent heat of skin. (Dict. de Médecine, loc. cit.) M. Broussais observes that the excess of pain is capable of disorganizing the brain by a too impetuous afflux of blood into its capillaries, and that after much suffering, the delirium, convulsions, and coma are frequently the effect of the disease of the brain itself. (History of Chronic Phlegmasiæ, translated by Hays and Griffith, vol. ii. p. 359.)

The lungs and pleura may also be affected simultaneously with the peritoneum, in which case thoracic pain, cough, dyspnœa, and other pectoral symptoms will be present. This complication is not very uncommon. M. Dugès found traces of inflammation of the pleura in forty cases out of two hundred and sixty subjects who died of puerperal peritonitis, and whose bodies he examined after death. (Journal Complémentaire, tom. xxxvi. p. 218.) The parenchyma of the lungs, or the pericardium may be also affected, but such cases are rare. Other complications may exist which would lead us into too long a detail to include: we trust sufficient has been said to impress on the mind of the medical practitioner the importance of directing his attention to the state of other organs and textures in cases of inflammation of the peritoneum.

[M. Chomel (*Dictionnaire de Médecine*, 2d edit. xxiii. 560, Paris, 1841,) is of opinion, from long observation, that spontaneous and primary peritonitis is a rare disease. In the space of fifteen years, he does not recollect a single case of fatal peritonitis, in which the assertion was negatived. In this respect, peritonitis is an exception amongst the serous membranes—the pleura, pericardium, meninges of the brain, being often the seat of primary phlegmasiæ.]

III. Puerperal Peritonitis. — The peritoneum is very liable to become inflamed in the puerperal state, those portions especially connected with the uterine organs. The uterus or its appendages are generally the first parts that become affected, and the morbid action spreads by contignity or continuity to the general surface of the peritoneum; it consequently usually exists complicated with an inflammatory affection of one or more of the textures or organs belonging to the uterine system. This subject has been already fully considered in the article Puerperal Fever.

to which we refer for details; but puerperal females may be affected with peritonitis in its simple form, when it presents some peculiarities deserving attention. Its predisposing causes are the high degree of irritability of the system which exists subsequent to parturition, and more especially in the peritoneum, from the sudden abstraction of distension which it undergoes by the contraction of the uterus after the expulsion of the fœtus. M. Chomel observes that the repeated friction to which the peritoneum is subjected during labour may account for the primitive development of peritonitis in those cases where it appears without inflammation of the uterus. (Dict. de Médecine, art. *Péritonite.*) Dr. Burns remarks that those who have suffered from uterine hemorrhage after delivery are most liable to this disease. (Midwifery, p. 526.) The affection may also be excited by violence during parturition, by the application of cold, or the injudicious use of stimuli. When it occurs during the prevalence of puerperal fever, it appears evidently to owe its origin to an epidemic cause, and in some instances to be communicated by contagion. It may therefore be considered as occurring under two forms, 1. as a sporadic disease, and, 2. as an epidemic. (See Fever, Puerperal.)

1. *Sporadic puerperal peritonitis* sometimes becomes developed a few days after parturition, but occasionally two or three weeks intervene, and in some cases the pulse continues frequent from the time of delivery till the accession of the inflammation. The first symptom that manifests itself is generally pain in the abdomen, which is usually preceded or accompanied by rigors; and Dr. Denman (Denman's Midwifery, p. 433, 6th edition,) observes that from the violence and duration of the shivering, we may generally estimate the danger of the succeeding disease.

The abdomen becomes exquisitely painful on pressure, and this symptom is usually accompanied by vomiting, thirst, sharp, small, frequent pulse, and white dry tongue. The symptoms are in fact, generally speaking, the same as those which ordinary peritonitis presents, with some modifications, however, derived from the peculiar state of the affected parts induced by parturition. The pain more especially occupies the hypogastric region, and when it extends to other parts of the abdomen, it still continues most intensely in this situation, indicating that the peritoneal covering of the uterus is principally affected. The abdomen becomes distended more rapidly and to a greater extent than in the other forms of the disease, owing to its not offering so much resistance in consequence of its relaxed state subsequent to delivery; but it does not present quite so much hardness and tension as in ordinary cases. The lochia are diminished or suppressed. The lacteal secretion is either not established or is arrested, and the breasts consequently either do not swell, or collapse after having been swollen. The disease generally runs a short course, and rarely terminates in the chronic state. When it terminates favourably, the abdominal tumefaction subsides as rapidly as it had before augmented; the lochial and lacteal secretions are re-established; the pain abates, and the vomiting ceases; the pulse becomes fuller and slower, and the other signs indicative of termination by resolution, which have been already described, are exhibited.

The fatal termination is characterized by the increase of abdominal tumefaction, pain, and tenderness, quick irregular pulse, Hippocratic countenance, cold extremities, and sometimes by the sudden cessation of pain, while the other unfavourable symptoms continue. Dr. Gordon has related some cases which terminated by suppuration; in two instances the matter escaped externally by the umbilicus, and in a third by the urethra.

2. *Epidemic puerperal peritonitis* may be considered as a variety of puerperal fever, which has by some been thought to depend in every instance on inflammation of the peritoneum; but it has been already demonstrated that various forms of uterine inflammation may occur in this fever, and give rise to a variety of symptoms, and that these local inflammations may exist independently of each other, though they are frequently combined. (See Fever, Puerperal.)

When this fever excites peritoneal inflammation, it is not, according to Dr. Gooch, "one uniform disease, but may occur under different forms; it is sometimes so mild as to be curable by the gentlest aperients, and at other times is very obstinate and fatal. In this latter form it sometimes consists of acute inflammation of the peritoneum with inflammatory fever, which bears and is curable only by early and active depletion; sometimes of inflammation and fever of a low type, in which depletion is useless and even pernicious." (On Diseases of Females, p. 14, 15.) He observes "that in the leading circumstances of the disease there is certainly a great uniformity: it almost always commences a few days after delivery, is marked by pain and tenderness of the belly, and a rapid pulse; and if not cured, terminates fatally within a week, and after death commonly leaves the depositions and effusion of inflammation: thus far it is very uniform, but no further." (P. 33.) He describes the leading symptoms of the epidemic of 1812—which he witnessed—to be "diffused pain and tenderness, with some swelling of the abdomen, a quick pulse, which was generally at first full and vibrating. Sometimes it was small, but still it was hard and incompressible; the skin was hot, though not so hot as in other fevers; the tongue was white and moist; the milk was suppressed. As the disease advanced, the belly became less painful, but more swelled, and the breathing short; towards the end, the pulse was very frequent and tremulous, and the skin covered with a clammy sweat: even in this state the tongue continued moist and the mind clear, and death took place generally about the fifth day. On opening the abdomen, which was often as large as before delivery, the intestines were found distended with air; the peritoneum was red in various parts, its surface was covered with a coat of lymph; the intestines adhered to one another, and the omentum to the intestines; coagulable lymph was deposited on various surfaces, especially in the depressions between the convolutions of the bowels and on the omentum, on both which parts it often lay in large masses; the cavity of the peritoneum contained several pints of a turbid fluid, apparently serum mixed

with lymph. In the uterus, the morbid appearances were generally confined to its peritoneal covering, which was coated with lymph, on removing which the membrane itself was found unnaturally red; but in some cases the disease had penetrated deeper into the uterus, the substance of which was sometimes infiltrated with pus, and sometimes contained small abscesses about the size of a nut; the inner surface of the uterus, especially at the fundus, often appeared black and ragged, as if gangrenous. The enlargement of the abdomen depended entirely on air in the intestines; when there was no air there was no enlargement, even though the peritoneum contained several pints of fluid." (P. 39, 40.) He describes several gradations of this affection, which have been already considered in the article PUERPERAL FEVER.

We have been induced to make this long quotation, in order to demonstrate that puerperal peritonitis, when epidemic, is nearly identical in its symptoms and post-mortem appearance with the common form of the disease. The peculiarities which it presents it possesses in common with the sporadic form, occurring after parturition, from which it only differs in its epidemic and occasionally contagious origin, in its frequent complication with uterine affections, and in being attended, in some instances, with a fever of a typhoid character. It appears to us that the epidemic form is primarily a fever that excites peritoneal inflammation which is to be considered as symptomatic of a constitutional affection; and that the sporadic form is an idiopathic inflammation, modified by the peculiarities of the puerperal state.

This view accords with Dr. Armstrong's ideas on the nature of this disease. He states that puerperal fever "is a common or specific fever, occurring in the puerperal state, and modified, like almost every other affection, by the condition of the patient at the time of the attack. In general," he further observes, "it is a common fever combined with inflammation of the abdominal and pelvic viscera, but it is sometimes genuine typhous fever, occurring in the same state, and then superadded to the symptoms of peritonitis, are developed, rapidly for the most part, those symptoms by which a fully formed typhus can be recognized." (Armstrong's Morbid Anatomy, p. 96.) Dr. S. Cusack, of Dublin, in his paper on puerperal fever, (Edin. Med. and Surg. Journ. January, 1829,) observes that the low form of puerperal fever which exhibits a typhoid character was sometimes epidemic, and that the seasons which appeared to favour its occurrence are such as give rise to typhous fever, erysipelas, and diseases of a low type." It appears, therefore, to originate from the same causes as epidemic fevers, to exhibit the same constitutional symptoms, with only this peculiarity, that the uterine organs or peritoneum are in every case inflamed, an effect which we might, *à priori*, expect in the event of fever attacking a puerperal female.

IV. VARIETIES OF PERITONITIS.—This disease presents several modifications in addition to those above described, which being attended with some peculiarities with respect to their causes, symptoms, and progress, are deserving of separate consideration. The principal of these are: 1. hemorrhagic peritonitis; 2 erysipelatous peritonitis; 3. peritonitis from intestinal strangulation; 4. latent peritonitis; 5. partial peritonitis; 6. peritonitis from perforation of the intestines; 7. peritonitis from paracentesis of the abdomen.

1. *Hemorrhagic Peritonitis*, [*Hémapéritonirrhagie* of Piorry.]—This form of the disease is very rare: its predisposing causes appear to be a sanguine temperament, and a constitution liable to hemorrhagies and inflammatory affections. If in such persons any irritation acts peculiarly on the abdominal serous membrane, an hemorrhagic action may be determined to its vessels, and a sanguineous effusion thus takes place into the peritoneal cavity without any rupture of vessels. The symptoms of this variety are similar to those of acute peritonitis. The pain, however, appears to be much more violent, and to be characterized by marked intermissions: the anxiety is greater; it is accompanied with pyrexia, a pulse at first strong and inflammatory, which afterwards becomes expanded and soft, and finally, at the approach of death, quick and small. The disease runs a very rapid course, and convulsions, with coldness of the extremities, precede the fatal termination. (Broussais' History of Chronic Phlegmasiæ; by Hays and Griffith, vol. ii. p. 182.)

2. *Erysipelatous peritonitis.*—This variety appears to owe its cause to the transference of erysipelatous inflammation from the skin or mucous lining of the throat and fauces to the peritoneum: its symptoms, as described by Dr. Abercrombie, are "sometimes slight and insidious, but sometimes very severe, and they are chiefly distinguished by the rapidity with which they run their course, and by a remarkable sinking of the vital powers, which occurs from an early period, and often prevents the adoption of any active treatment: a remarkable circumstance in the history of the affection is its connection with erysipelas and other diseases of an erysipelatous character." (On the Abdominal Viscera, p. 182.)

In one case which he relates, the day after the disappearance of erysipelas from one of the lower extremities, acute pain attacked the region of the stomach, which, in a short time, moved to the lower part of the abdomen, and around the umbilicus, with little tenderness on pressure, but accompanied with great anxiety and restlessness: the patient sunk rapidly, and died twenty-four hours after the attack. Dissection discovered a considerable quantity of bloody sanies in the abdomen, part of the small intestines of a dark red and part of a dull leaden colour, and the whole were considerably distended.

The form in which the throat is primarily affected seems occasionally to owe its origin to an epidemic cause. Dr. Abercrombie relates that in the spring of 1824 it prevailed as an epidemic in the Merchants' Hospital in Edinburgh. Its leading features were a slight erysipelatous affection of the throat, beginning with vomiting and slight fever: in some cases the internal fauces were covered with aphthous crusts or swelling of the uvula, and in some cases there were angry ulcerations about the lips, with sponginess of the gums, the larynx was unaffected in every case, and, excepting in two instances, which proved fatal by the supervention of abdominal inflammation, the

symptoms were mild, and little treatment was necessary. In the two cases referred to, the patients were attacked with the above symptoms, and, when recovering, pain and tenderness in the abdomen and serious constitutional disturbance supervened, and proved rapidly fatal. The two fatal cases render it probable that the erysipelatous action may invade the peritoneum as well as the membrane of the mouth, and that its symptoms and history sufficiently distinguish it from common peritoneal inflammation. The post-mortem appearances were peculiar, consisting of a bloody serum or pus mixed with shreds of a flaky matter, but without much or any of that inflammatory or adhesive exudation which forms so prominent a character of peritonitis in its common forms.

3. *Peritonitis from intestinal strangulation.*—This form may arise from internal or external strangulation of a portion of intestine. It presents for some time obscure symptoms, the inflammation being at first limited to a small space, and it extends itself gradually from that portion of peritoneum which is strangulated to the rest of the membrane. When the whole peritoneum becomes affected, this variety presents the same general appearance as ordinary peritonitis: it differs, however, not only in the exciting cause, but also in the succession of the phenomena which it presents; in exhibiting some symptoms which accompany it in its whole course; by its termination, and by the mode of treatment which it requires.

In this variety constipation and vomiting are frequently the first symptoms which appear, to which pain succeeds; febrile paroxysms do not, however, develope themselves till after the last symptom, or even later. In the whole course of the malady, the constipation and vomiting, the irregular form of the belly, the parietes of which are elevated in several points above the obstacle, give a peculiar aspect to this variety of peritonitis. It is much more dangerous than ordinary peritonitis, and in treating it we ought to have more in view the removal of the exciting cause which still continues to operate than the management of the inflammation itself." (*Chomel*, Dict. de Médecine, tom. xvi. p. 326.)

4. *Latent peritonitis.*—Nearly all the characteristic symptoms of peritonitis may be absent, and yet the disease exist and be productive of serious effects, and even terminate fatally. This will be most apt to occur in patients of feeble powers and advanced age, in maniacal persons, or in those affected with some severe malady, which may either absorb the attention of the physician, or mask, by its greater intensity, the peculiar symptoms of peritonitis. In such cases, it may steal on without pain or any accompanying pyrexia, and the only criteria by which we can judge of its existence, are perhaps the expression of the countenance, and, on a close examination, some degree of tumefaction and tension of the abdomen, and, occasionally, an obscure sensation of pain excited by pressure.

5. *Partial peritonitis.*—This affection may be confined to a small portion of the peritoneum during its whole course. This variety may be caused by a contusion or wound penetrating into the abdomen, or it may succeed to a surgical operation, in which the abdominal parietes or viscera are concerned; while in some instances it may arise without any apparent cause. It often commences without rigors, by a pain in a limited point of the abdomen, augmented by pressure, often accompanied with some tumefaction or hardness in the affected part, and occasionally with febrile symptoms of some intensity; but in general the vomiting and alteration of the countenance, which so frequently attend general peritonitis, are absent. It may, however, become general, and then it will present the same phenomena as the common form of the disease. When it remains circumscribed, it commonly terminates favourably in a short time, the effusion, then small in quantity, being absorbed. In some instances, the inflamed portion becomes the seat of a collection of pus circumscribed by adhesions, which may escape into the stomach or intestines by erosion of their parietes where they have formed an adhesion to those of the abscess. M. Chomel supposes that in most of those cases where, after signs of local peritoneal inflammation, pus is discharged from the stomach or intestines, it owed its origin to this source. Several forms of local peritonitis have been described by authors. Dr. Cullen mentions two, neither of which, however, he ventures to discriminate by any characteristic symptoms.

The peritonitis *omentalis* he tells us affects the omentum, and the peritonitis *mesenterica* the mesentery. (Synopsis Nosologiæ Methodicæ, tom. ii. p. 109.) Dr. Mason Good informs us that the omental peritonitis is characterized by a more sensible swelling in the region of the omentum. (Study of Medecine, 1st edition, vol. ii. p. 371.) The same author describes mesenteric peritonitis as being attended with a pain deeper-seated, and more immediately in the mesenteric region, the external tenderness being less than in the other forms. Frank states that it is accompanied with deep pain in the back and in the umbilical region, that it often terminates in abscess, which may obstruct the bowels by mechanical pressure, or open into the cavity of the abdomen, or into the intestines. (*Frank*, De Curandis Hominum Morbis, lib. ii. ord. iv. gen. 1.) Frank also mentions a variety of local peritonitis confined to the lining of the abdominal muscles, which, when limited to the covering of the rectus, sometimes causes the shape of that muscle to be developed, and effusion of lymph or blood into its sheath, with tension, distension, and occasionally speedy gangrene. When, also, the general peritoneal lining of the abdominal muscles is inflamed, the sensibility to pressure will be very great, and if it terminates in suppuration, an immense collection of purulent matter may form between the peritoneum and muscles, stimulating ascites. The same author also states, that when the peritoneum covering the bodies of the vertebræ is inflamed, it will give rise to pain in the back, in the situation of the lumbar vertebræ, much increased by the erect position of the body, and resembling in some respects disease of the kidney. When the peritoneal covering of the psoas and iliacus internus is inflamed, pain is felt in the region of those muscles, extending through the groin to the thigh, which cannot be extended without an increase of suffering, but is unattended

by any difficulty in passing the urine or fæces. Dr. Abercrombie describes several symptoms of peritonitis, which seem to arise from the inflammation having its seat more peculiarly in the serous envelope of certain organs. When the covering of the liver is affected, the case can scarcely be distinguished from acute hepatitis. When it occurs in the neighbourhood of the kidney, Dr. Abercrombie thinks it may give rise to true ischuria renalis, proving fatal by coma and effusion in the brain.

These varieties of peritonitis are interesting in one point of view, as they enable us to explain the predominance of certain symptoms in individual cases, and an attention to them may, in some instances at least, prevent our mistaking affections of the peritoneum for diseases of the organs which it covers, and may also be a useful guide as to the local treatment.

6. *Peritonitis from Perforation.*—For an account of this variety, we refer to *Peritonitis from perforation of the serous membrane.*

7. *Peritonitis from Paracentesis.*—In this variety the pain is generally first perceived in the point where the puncture was made. The flaccidity of the abdominal parietes, and the rapid tumefaction of the belly which occurs when peritonitis arises from this cause, bear some resemblance to the phenomena which puerperal peritonitis exhibits. This form has almost invariably a fatal termination; in most cases that we have seen, it ran its course in a few days, and was attended with greater prostration of strength, and less of febrile excitement than the common form of the disease.

V. Chronic Peritonitis.—When acute inflammation of the peritoneum continues beyond the fifteenth or twentieth day, it generally becomes chronic: this species of the disease may, however, arise primarily from the exciting causes we have before enumerated, operating on a patient of advanced age or debilitated constitution. Particular occupations which cause pressure on the abdomen, may predispose to or excite this disease, to which may be added cold and moisture, prolonged residence in hospitals, fatigue, unwholesome food, protracted intermittents, and any kind of slow effusion into the cavity of the abdomen.

We shall consider chronic peritonitis under two heads: 1st, *primitive*, without being preceded by symptoms of acute inflammation; 2d, *consecutive*, following as a consequence of acute peritonitis.

1. The primitive form may commence in a slow and almost insensible manner, without presenting any very obvious symptom. There may not be any abdominal pain at its commencement or during its course, and it may only exhibit the appearance of simple ascites: in many cases we cannot ascertain with any certainty its presence during life, but when it is more open in its characters, they are identical with the consecutive form, the symptoms of which vary considerably in the early stages. It is in general attended with some abdominal pain, which is mostly deep, not very acute, and rarely permanent; in many cases the patient only complains of pain when his abdomen is pressed either by the hand or the action of the surrounding muscles, or on a sudden shock of the body. There is occasional vomiting and more or less distension of the abdomen, which sometimes becomes tympanitic; and in some cases indurated spots can be felt, which are tender to the touch. Emaciation, irregular bowels, either constipation or diarrhœa, or the one alternating with the other; increasing distension of the abdomen, and inability to bear even the pressure of the ordinary dress if at all tight; various dyspeptic symptoms, and general debility, mark the progress of the disease. The alvine evacuations are sometimes of a pale colour and peculiar fœtor, in other instances of a dark appearance, and sometimes nearly natural. (*Abercrombie*, p. 192.)

Dr. Pemberton observes that there is no tension of the skin of the abdomen, as in the acute species; on the contrary, that the skin and abdominal muscles sit loosely upon the peritoneum, which gives a sensation to the touch, as of a tight bandage underneath, over which the skin and muscles may be said, as it were, to slide. (On Diseases of the Abdominal Viscera.)

In some patients the appetite is often preserved, and the digestion is but little deranged, in which cases we may conclude that the peritoneum reflected over the stomach is not very deeply involved in the disease. Broussais mentions the sensation of a ball rolling about in the abdomen, and sometimes approaching the throat, which he attributes to the agglutination of the intestines, these forming, with the gorged mesenteric glands, a round and mobile mass in the belly, often without any effused fluid. (Lond. Med. Chir. Review, Sept. 1820, p. 170.)

The general phenomena are very obscure: the pulse is often natural, except towards evening, when it becomes quick, with increased heat of skin, and slight flush on the cheeks, and occasionally some dyspnœa and cough. Dr. Pemberton, however, observes that though the pulse is somewhat accelerated, and the tongue, particularly in the morning, slightly covered with a white fur, with considerable thirst, he never observed any exacerbation of fever in the evening, or any hectic flushes on the cheeks: on the contrary, the countenance is full of languor, and the face is pale and doughy.

In some forms of the disease, the abdomen becomes augmented in volume, yields a dull sound on percussion on a part or the whole of its surface, and occasionally presents the sense of fluctuation more or less obscure, with an œdematous swelling limited to the inferior extremities or parietes of the abdomen. (*Chomel*, Dict. de Médecine.) In other forms, the abdomen rather diminishes than augments in volume, and offers an unnatural resistance on pressure, with, occasionally, some degree of projection near the umbilicus, occasioned by the intestines matted together in a mass before the bodies of the vertebræ.

With more or less of these symptoms, the disease advances slowly, and sometimes remains stationary for several months, and even may in some cases present some temporary amendment; but it generally terminates fatally, either by the supervention of acute peritonitis or enteritis; or the patient sinks from exhaustion, the result of long-continued irritation or diarrhœa. In some instances, ascites precedes the fatal termination, or purulent

effusion into the abdominal cavity takes place, which may escape outwardly by the umbilicus or inguinal ring: or the tubercles which have been developed on the peritoneal surface may ulcerate, and form a communication between the intestines and cavity of the peritoneum, with escape of the contents of the former into the sac of the peritoneum, inducing acute peritonitis, which proves rapidly fatal; or disease of the mesenteric glands may be induced, and the patient dies in a state of marasmus with hectic symptoms.

The **diagnosis** in this disease is extremely obscure, and is rather to be deduced from a close consideration of the history of each case, the predisposing and exciting causes, and the assemblage of local symptoms, than from any definite rules.

Its **prognosis** in general is unfavourable. M. Broussais, in an early edition of his work, considered it as incurable; afterwards, however, he met with several cases which terminated favourably. Dr. Abercrombie succeeded in curing some cases in individuals whose families had formerly suffered from this affection. Dr. Pemberton states that the symptoms which indicate recovery are an abatement of the pricking pains in the abdomen, and a diminution of the frequency of the pulse to eighty in a minute; but that under these favourable appearances a relapse is always to be dreaded.

Morbid Anatomy of Peritonitis. — The alterations which the peritoneum presents after death from this disease, are essentially the same as are found in cases of inflammation of other serous membranes. The morbid effects are greater or less, according to the intensity and duration of the disease. They are sometimes confined exclusively to the peritoneum, evidencing that this membrane may be partially or generally inflamed, without the subjacent tissues being affected: however, in some of the complicated forms of this disease, morbid lesions of the other intestinal tunics will be occasionally discovered to coexist with those characteristic of peritonitis.

The following are the effects of inflammation of the peritoneum, as far as they are revealed by dissection: — 1. increased vascularity and thickening of the peritoneum; 2. effusion of coagulable lymph, either in the form of flocculi, membranes, bands, or masses; 3. effusion, into the peritoneal cavity, of various fluids, serum, pus, or blood, mixed or separate; 4. gangrene; 5. tuberculous formations; 6. granulations on the peritoneal surface; 7. ulceration.

1. *Morbid appearances in acute peritonitis.*— The first effects of a low degree of inflammatory action upon serous membranes appear to be simply an increased deposition of the serous fluid; and in this manner it is probable that a certain state of these membranes, which, if not actually inflammatory, closely borders upon it, is sometimes relieved; the increased quantity of fluid being afterwards absorbed, and the parts recovering their healthy relations. (*Abercombie*, p. 3.)

When inflammation is fully established, its earliest effect is increased vascularity, which produces at first a slight degree of opacity of the membrane, and red points begin to appear on its surface, which may either occupy a small portion, or cover nearly the whole extent of the peritoneum; the surface of which at this time appears dry and shining, but on touching it an unctuous coating will be detected. Sometimes, instead of the red points, blood-vessels are developed, forming red striæ more or less numerous. As the inflammation advances, the small points become multiplied, coalesce, and form patches of variable extent, and the blood-vessels become more evident and numerous. In a more advanced stage, the redness is rendered more intense, and occupies a larger portion of the membrane; sometimes forming broad surfaces of inflammation, which run like bands along the course of the intestines, and are bounded by the adhesions which different portions of the bowels contract with each other. This redness is frequently arborescent, sometimes intermixed like network. The vascular injection has been supposed by some to exist in the arterial capillaries; but Dr. Armstrong observes, that whatever may be the case during life, it is after death chiefly seated in the venous capillaries; for on a minute inspection, the small ramifications of the arteries may be seen empty, traversing the intermediate portion of intestine, like so many transparent lines. The degree of redness is ultimately influenced by the quantity of secretion being greater in those cases where there is least serum and lymph.*

Along with this redness we observe more or less thickening and opacity of the peritoneum; an effect produced not only by the hyperæmia of the inflamed part, but also by the effusion of serum, lymph, or both, into the subserous cellular tissue, which causes some degree of pulpiness, and a facility in separating the serous coat from the subjacent parts. The serous membrane itself is also thickened by the effused fluid penetrating between its laminæ, and separating them more or less from each other, and in some instances a slight degree of emphysema exists, from the disengagement of air in the connecting cellular tissue; but when the inflammation is slight, this thickening is not apparent.

The intestines are much thicker and more massy, as well as the mesentery and the mesocolon; and the omentum sometimes is rendered as thick as a person's hand; effects which arise from the extravasation of coagulable lymph into the cellular substance between the laminæ of peritoneum which forms them. (Baillie's Morbid Anatomy.

Redness and thickening may be considered as

* M. Scoutetten asserts that this redness, when intense, is not owing to the distension of the blood-vessels, but to a sanguine exudation which is formed on the surface of the peritoneum, and which adheres strongly to it; and that the surface is uniformly red, and appears villous. Both causes probably concur to produce the effect.

Bichat, M. Gasc, and others, have asserted that the absence of redness on the peritoneal surface after death may occur in cases where the membrane was inflamed during life. M. Scoutetten, (Archives Générales, tom. iii. p. 501,) however, from some experiments he has performed on living animals, has come to a contrary conclusion: he asserts that the disappearance of redness from an inflamed *external* surface after death is owing to the pressure of the atmosphere, which has but a very modified influence on an *internal* tissue; and that, consequently, the characters of inflammation are very nearly the same in those tissues during life and after death: his experiments are highly ingenious, and would seem to justify the conclusion he has deduced from them, viz. *that an inflammation of an internal membrane will in every case leave increased redness after death.*

the first effect of peritoneal inflammation; but it is accompanied or quickly followed by effusion of serum and lymph, which have been supposed to be separated simultaneously. Dr. Armstrong, however, seems to think that the lymph is first effused; but it would appear that the degree of intensity of the inflammation determines the nature of the effusion. When the inflammation is not very violent, serum seems to be the earliest product of the vessels of the affected part; but if the inflammatory action is very acute, lymph is often thrown out in the first instance. This effusion of lymph may take place a very short time after the commencement of inflammation; it is at first soft and gelatinous, afterwards becomes more consistent, and finally assumes the texture of a membrane of considerable tenacity. It generally soon becomes organized: Andral (Clinique Médicale,) observes that in some cases, twenty hours after the commencement of peritonitis, vessels can be traced and injected in this fibrous concretion, which has become a living texture; in other cases, after several months, no trace of organization can be found in these membranous layers. This coagulable lymph may assume various forms; it may either be deposited in a lamina of variable thickness, lining the peritoneal surfaces, agglutinating the intestines to each other, to the abdominal parietes, or to the omentum; or narrow bands of membrane, of variable length, may connect two or more coils of intestine together; or a mass of lymph of a prismatic form may lie between the intestinal convolutions, filling up their interstices, the anterior flat surface of which mass corresponds to the parietes of the abdomen, and the two other surfaces, slightly concave, are applied on the two contiguous intestines, and terminate in their interval by a rounded angle. The lymph may also be in the form of flocculi, or small shreds of membrane, floating in a serous fluid, or deposited on the free surface of the peritoneum when little or no fluid is found.

These false membranes are either of a white colour, grey, or sometimes a little reddish; they vary in their thickness from a quarter to two or three lines. When the inflammation has lasted twenty or thirty days, these adhesions acquire a considerable degree of firmness; they are often productive of no inconvenience, but if very numerous, and uniting the coils of intestine very closely together, they may give rise to a modification of the form of the belly, an habitual tension in the abdomen, and more or less disturbance in the digestive functions. Dr. Abercrombie relates some cases where fatal ileus seemed to be induced by the operation of such causes, which appeared to act by deranging the muscular power of the intestinal canal, or by inducing a strangulation of a portion of intestine.

Serous effusion, as we have before observed, may take place very early in this disease;* but in general it is not considerable in quantity until the affection has existed for some time. This, however, is not always the case: in some instances, after thirty-six or forty hours, there is a large quantity of fluid effused; it is generally accumulated in the inferior parts, unless retained in distinct cavities by adhesions. Its colour varies very much; it is sometimes limpid; and that is principally the case when the peritonitis has been partial:† at other times it is whitish, greyish, milky, or yellowish, and occasionally has all the sensible properties of pus. Dr. Abercrombie observes, that the opaque milky deposition is commonly connected with alteration of the structure of the membrane, which in such instances presents a soft thickened appearance, resembling a part that had been boiled. The more common appearance of the peritoneum consists of a deposition of false membrane, coexisting either with the milky flocculent fluid, or with pus, or a fluid entirely limpid. In the latter case the deposition on the surface of the membrane will prevent the re-absorption of the fluid; so that the accumulation which might otherwise have disappeared will thus become a permanent cause of ascites, provided the disease does not prove speedily fatal. (*Abercrombie*, p. 3.)

This effusion is sometimes reddish, evidently from a mixture of the colouring matter of the blood; and in the hemorrhagic variety of peritonitis, large quantities of blood in a coagulated state have been found by M. Broussais in the peritoneal cavity, without any rupture of vessels being detected, accompanied with extensive ecchymoses of the cellular tissue which unites the peritoneum to the contiguous parts.

The quantity of fluid effused in peritonitis varies from a few ounces to several pounds; its consistence is sometimes that of water, without containing any albuminous clots; at other times it equals that of milk or the pus of the cellular tissue, and often contains the flocculi before mentioned.

The peritoneum is seldom found in a state of gangrene in its whole extent; but eschars of variable size, and of a greyish slate-colour or bluish, are formed, which are easily lacerated, and exhale a fetid odour. The surface of these eschars is often covered with a greyish soft matter, little adherent, which appears to be the commencement of decomposition: these eschars sometimes pervade the entire thickness of the intestinal tunics, or the great epiploon, or extend deeply into the abdominal parietes.

There are certain brownish, black, or violet degenerations of the peritoneum which have been mistaken for gangrene, but are only the results of chronic irritation; they are easily distinguished by not being readily torn, by being destitute of the gangrenous odour, and by the great extent to which the peritoneum is discoloured, the entire membrane being sometimes affected. These appearances are a common consequence of chronic peritonitis.

Ulceration very rarely occurs as a consequence of peritonitis; though not unfrequently the peritoneum is perforated in cases where the ulcerative

* In some cases of peritoneal inflammation the secretion of this membrane is suspended, and it appears dry.

† Bichat observes that, when serous effusions are the consequence of an affection of a viscus, the serosity is limpid, transparent, and probably of the same nature with that which is exhaled in its natural state; but that on the contrary, when the effusion depends on inflammation of serous membranes, the fluid is almost always altered. (*Roche et Sanson*, Elemens de Pathologie, tom. i. p. 552.)

process, commencing in the mucous membrane, erodes the other coats of the intestines; this naturally leads us to consider peritoneal ulcers as of two kinds:—1. *primitive ulcers*, or those which occur primarily in the peritoneum as a direct consequence of inflammation; 2. *consecutive ulcers*, or those which originate in the intestinal mucous membrane.

There are not many cases on record of primitive ulceration of this membrane. M. Scoutetten observes, that if the patient is not exhausted, and continues to live for some time, crosions of the peritoneum, at first slight, become by degrees more and more deep, and are converted into true ulcers, which may extend and destroy all the membrane, and even the subjacent tissues. (Archive Générales, tom. iv. p. 392.) In a patient who had suffered from a venereal affection, and had experienced pains in the lumbar region, most severe at night, M. Portal found, on examination of the abdomen after death, several ulcers covered with pus in the peritoneum situated on the anterior of the lumbar vertebræ and of the kidneys. The same author cites Bouet and Paw as having seen subjects in whom the peritoneum appeared eroded to a great extent. (Anatomie Pathologique, tom. v. p. 126.) M. Scoutetten observed the diaphragmatic portion of the peritoneum ulcerated in one case to the extent of two inches; and there is a case also mentioned by the same author, in which, after symptoms of peritonitis, the abdominal parietes were perforated at the umbilicus, and a whitish fluid of the consistence of pus escaped from the abdomen. We have before mentioned, in treating of partial peritonitis, that purulent effusions in this form of the disease occasionally escape by an opening into the stomach or intestines; from this we would infer that ulceration of this membrane may occur more frequently than is generally supposed, but there are not many cases of this description on record.

Consecutive ulceration is much more frequent, and will be fully considered in the article *Peritonitis from perforation of the serous membrane.*

2. *Morbid appearances in chronic peritonitis.*—The organic changes which are the consequence of chronic peritonitis are very nearly the same as those which result from the acute form. There are some peculiarities, however, belonging to the chronic species which deserve attention. In chronic peritonitis, the redness, the result of increased vascularity, is of a darker hue, and the larger branches of veins are more considerably dilated. (*Armstrong*, p. 76.) The peritoneum has acquired a greater thickness, and the inflammation appears to have penetrated to the subjacent membranes and organs. The false membranes are very numerous and firm, and unite many coils of intestine; sometimes they form a kind of envelope which surrounds the great epiploon and the intestines, and sometimes partial pouches are formed by false membranes which contain a quantity of fluid: when these membranes are detached, we find the subjacent peritoneum less red than in acute peritonitis. In some subjects scarcely any liquid is found: in these cases the false membranes are less abundant and less thick; and the intestines are united to each other by the adhesions which the inflammation has caused them to contract, and not by intermediate albuminous layers. (*Scoutetten*, Arch. Gén. tom. iv. p. 387.)

In some subjects, on the other hand, a considerable quantity of effusion is found without any false membrane on the peritoneum, which is thickened, reddish, and exhibits a multitude of dilated blood-vessels. The epiploon is red, thick, and fleshy, and sometimes contains between its laminæ transparent vesicles like hydatids, and substances resembling granulations are occasionally seen on its surface.

When the peritonitis has been of several months' duration, it sometimes occurs that the abdominal parietes are not distended by effusion, but are pressed close to the intestines. The epiploon is covered with a crowd of whitish tubercles of variable size, surrounded with blood-vessels more or less developed. These tubercles may also exist on any part of the peritoneal surface: Dr. Armstrong has found them under three modifications, 1. as small miliary points semi-transparent and firm; 2. as uniformly opaque bodies of a larger size and nearly of the colour and consistence of the kernel of the ripe horse-chestnut; and, lastly, as soft white substances, not unlike cut portions of the medullary matter of the brain. The first and second modifications are seated in the subserous cellular tissue, and likewise between the mucous and muscular intestinal coats; but the soft medullary variety appears to be formed in general on the free surface of the serous membrane itself. (Morbid Anatomy, &c.) Tubercles at first are extremely minute, but they gradually increase in size and number, and sometimes coalesce: they occasionally exceed the size of a large pea. When small, they are of considerable consistence, and adhere with such tenacity to the peritoneum, that they can only be separated by tearing this membrane; but as they increase in magnitude, they become softer, and approach in their appearance to pus, when they can be easily detached. After being softened, they may again become indurated, and are sometimes converted into a calcareous matter. Occasionally, when they have existed for a considerable time, the peritoneum in the intervals between the tubercles becomes of an obscure red colour, or bluish or black, and presents a strong contrast with the white appearance of the tubercles. These bodies may ulcerate and give rise to perforation of the intestines; when tubercles exist, there is generally only a small quantity of fluid in the abdomen, which may be of different shades of colour from a grey to a black. In most instances, where they have been found on the peritoneum, they existed simultaneously in other organs, especially the lungs. If the symptoms which characterize a tuberculous diathesis coexist with signs of chronic inflammation or irritation of the peritoneum, we may have some reason to suspect a tuberculous state of this membrane.

M. Bayle has described certain bodies which he calls *granulations*, presenting a pisiform white appearance, and being of a hard consistence, not unlike miliary eruptions of the skin; but M. Broussais supposes they are nothing more than a transformation of the exuded matter which passed

from a liquid to an organized state. (History of the Chronic Phlegmasiæ of Broussais, by Hays and Griffith, vol. ii. p. 294.)

Chronic irritation may produce several other morbid changes on the peritoneum or the subserous tissue, the detail of which would include nearly the whole of the morbid anatomy of this membrane. It may become cartilaginous, bony, or scirrhous. The mesenteric glands may become diseased and tuberculous. Broussais has found vesicles resembling hydatids, and extensive lardaceous depositions, in the subserous cellular tissue. This fatty matter was not only deposited under the peritoneum, but also between the laminæ of the mesentery and omentum; it was of a white or yellow appearance like tallow, and mixed with a gelatino-albuminous fluid of thinner consistence and darker colour, which gave the whole mass a mottled appearance. He supposes this the result of chronic inflammation of the subserous tissue, but whether those productions are always to be considered the effects of inflammatory action is doubtful. They at all events are not the usual results of this state; and it appears necessary that a peculiar disposition to such formations must pre-exist in the constitution, which may be called into action, and determined to any particular structure or organ by the existence of chronic inflammation or irritation there.

M. Scoutetten* has described a morbid appearance, which he considers as peculiar to primitive chronic peritonitis. It consists of a number of greyish spots formed by little points, the number and close propinquity of which determine the intensity of the colour of the spots, which are sometimes brown or even of a black hue. These spots vary in number, and are sometimes only a line, and in other instances, an inch in extent. They are occasionally accompanied with an increased development of vessels. [M. Andral (*Cours. de Pathologie Interne*) regards the black patches as melanic.] Minute yellowish vesicles are also sometimes seen, and an abundant serous effusion almost constantly coexists, in general transparent, because the inflammation has not been sufficiently active to change entirely the mode of secretion.

Treatment.—The general principles of treatment which are applicable to other internal inflammations are equally so to this; with some modifications, however, arising from the nature of the texture affected, and from its relations to the organs which it covers. We shall first consider the treatment of this disease in the infant, and afterwards in the adult, and lastly speak of the management of chronic peritonitis.

1. *Treatment of infantile peritonitis.*—Our principal remedy in infantile peritonitis is the abstraction of blood, either general or local. In an infant under six months, though general bloodletting may often be required, yet a sufficient quantity can usually be obtained by the application of three or four leeches to the hand or foot, where we can easily control the hemorrhage, which cannot be done so effectively if the leeches be applied to the abdomen. Applied to the extremities they are nearly as efficacious in removing local inflammation in infants, as when applied to the vicinity of the part affected. They seem to produce the same result as a general bloodletting, as the face and lips become pale, the pulse falters, and syncope followed by vomiting occasionally takes place. These effects are apt to be produced when general bloodletting is carried to a considerable extent; and sometimes a state of nervous agitation and general commotion is induced, which, if not speedily removed, may terminate in death. The best remedies in a case of this kind are the horizontal position, cool air, and a drop or two of the tincture of opium. (*Dr. Cuming*, Transactions of the King's and Queen's College of Physicians in Ireland, vol. v. p. 49.)

Where general bloodletting is practised, from two to three ounces may be abstracted from an infant between six and twenty months old; at two years from three to four ounces; and when the age is above four, about five, six, or eight ounces may be drawn according to circumstances. After the inflammatory action is lowered by the abstraction of blood, advantage will be derived by establishing and keeping up an open state of the bowels, but we should avoid effecting this by irritating medicine. Small doses of calomel alone, or combined with a little of the pulv. corn. ust. cum opio, if the stomach is irritable, followed at intervals by castor oil or emollient enemata, will in general be found to answer sufficiently well. Fomentations to the abdomen will tend much to relieve the pain, and should be often repeated, and continued for some time; or we may put our little patient for a few minutes in the warm bath. If it is judged necessary to apply counter-irritation to the abdominal surface, warm flannel sprinkled with turpentine appears to us much preferable to blistering, as it produces a sufficient rubefacient effect, without the injurious consequences which blisters often produce on infants. The recommendation of M. Billard to remove the child from the breast, appears to us questionable. The sudden alteration in diet would be very apt to produce derangement of the stomach or bowels, a complication which would add to the danger of the patient. If the acute symptoms subside, and it seems probable from the continuance of abdominal tumefaction, slight dyspnœa, quick weak pulse, dry tongue, and hot skin, that the affection has passed into the chronic state, we should suspend or be sparing of evacuations: a leech or two to the abdomen may occasionally be necessary. The strength is to be supported by animal broths, arrow-root, &c.; the bowels regulated by calomel in the combinations above recommended, according to circumstances. The warm bath may be occasionally useful; also counter-irritation to the abdominal surface, and in some cases mercurial inunction.

Treatment of peritonitis in the adult.—Acute peritonitis, though generally attended with considerable danger, yet in the greater number of cases admits of a cure by active and early treatment. The following are the indications which we should have in view: 1. to reduce the action of the heart and vascular system; 2. to diminish the hyperæmia of the affected part; 3. to allay local and ge-

* Archives Générales, tom. iv. p. 398. We have been much indebted to this author for information on the morbid anatomy of the peritoneum. This essay contains more information on this point than any author we have consulted.

neral nervous irritation; 4. to restore the secretions to a natural state, and to excite the peristaltic action of the bowels; 5. to relieve urgent symptoms. Copious and early bloodletting are the most efficient means we can employ for the reduction of vascular action. This is indeed the principal therapeutic agent in this disease, in which it can be employed to a greater extent than in inflammation of mucous surfaces. Its efficacy is greater according as it is used early, and carried to such an extent as to make a decided impression on the system. The quantity abstracted is to be regulated by our estimate of the capability of the patient's constitution to bear depletion, and not by any arbitrary rule of quantity. We have seen five or six ounces produce as decided an effect on a delicate female as thirty ounces on a robust patient. We should take the blood from a large orifice, and allow the stream to flow either until the pain is relieved, or weakness of the pulse, paleness, and tendency to syncope is induced; the apparent debility which the patient exhibits in the onset of the disease is not to deter us from active depletion. The pulse commonly rises after venesection, and becomes fuller and softer, and the patient feels relieved and lightened, rather than exhausted by its employment. The advice which Dr. Abercrombie gives on the employment of bloodletting in this disease we have experienced the value of in many cases: viz. "to follow up the first bleeding by small bleedings at short intervals, when the effect of the first begins to subside: in this manner we prolong, as it were, the impression which is made by the first bleeding, and a twofold advantage arises from the practice — namely, that the disease is checked at an early period, and that the quantity of blood lost is, in the end, much smaller than probably would be required under other circumstances: if we allow the patient to lie after the first bleeding ten or twelve hours, or even a shorter period, the effect of it is entirely lost, and a repetition of it, to the extent of twenty ounces, may be required for producing that effect upon the disease, which by a former method might be produced by five. And, besides, the disease has been in the interval gaining ground, its duration is protracted, and the result consequently rendered more uncertain. The inflammation of a vital organ should not be lost sight of for above an hour or two at a time, until the force of it be decidedly broken; and unless this takes place within twenty-four hours, the termination must be considered as doubtful."

[In these cases, the combination of free bloodletting with opium, as advised under another head, (see Narcotics,) is often of the most marked advantage.]

The efficacy of bloodletting will depend in a great measure on its early employment, but we are not to abstain from it altogether at even an advanced period of the disease. If we have not been so fortunate as to see our patient in the commencement of the attack, still if the state of collapse has not been formed, if there is still some pulse and heat of surface, with abdominal pain and tenderness, we may abstract a moderate quantity of blood from the system with a chance of producing a good effect; or in debilitated patients apply leeches: but when the symptoms indicative of sinking are present, it would be obviously improper to take blood either generally or locally, as it would only hasten the fatal termination, and bring undeserved reproach on a valuable remedy.

Having reduced the general vascular action by the lancet, our next object should be to diminish the quantity of blood in the affected part by local bleeding, which will also assist in keeping up the constitutional effect produced by venesection. Gooch, (Diseases of Females, p. 45,) has well observed, "that as long as the pulse is quick, full, and hard, it is in vain to take blood from the affected part; if we could completely empty its gorged capillary vessels, they would be instantly gorged again, whilst the heart and large arteries are injecting them with so much violence. On the other hand, after having reduced the force of the general circulation, the capillary vessels of the part often remain preternaturally injected. This I conclude from the fact that the patient is often not relieved till local bloodletting has been used, and then is relieved immediately."

Having allowed the patient to recover from the faintness produced by the general bleeding, the abdomen should be slightly fomented with warm water, wiped frequently dry, and leeches should be applied in numbers proportioned to the urgency of the symptoms and strength of the patient. They should be especially concentrated over the parts where most pain and tenderness on pressure exist; and after they have fallen off, fomentations with cloths dipped in warm water should be assiduously applied and repeated for some time, which will both encourage the bleeding and soothe the irritation of the inflamed parts. The application of leeches may be repeated several times, as long as any considerable soreness remains.

Either before or during the application of the leeches, and as soon as possible after the vascular action has been reduced by venesection, from five to ten grains of calomel combined with one or two of opium should be administered, which may be repeated in diminished doses every three or four hours. By this combination, the constitutional and local irritation consequent on the inflammation, and which has a tendency to aggravate it, will be allayed by the narcotic; and the secretions, which have been more or less suspended or deranged, will be restored by the mercury, which modifies its action, and determines it to the skin, and is also supposed to equalize the circulation. After the second or third dose of this medicine, the bowels may be opened by mild aperients, aided by enemata: castor oil, in doses of from half an ounce to an ounce in some aromatic water, may be given if the stomach is not irritable. If vomiting is urgent, the Rochelle salts with the subcarbonate of soda, in a state of effervescence with lemon-juice, may be used in repeated doses, so as to produce a moderately laxative effect. Strong purgatives are highly injurious, and even a small dose of castor oil may exasperate the disease, if used previously to depletion. Having evacuated the bowels, the use of the calomel and opium should be resumed, and continued till the mercury has affected the system. As soon as salivation is established, we have generally found the symptoms become much mitigated, and our experience accords with that of

Dr. Gooch, who remarks that whenever the gums were affected in this disease, the patients invariably recovered. The establishment of mercurial action not only assists in subduing the inflammation, but may prevent or remove those effusions of lymph which afterwards form adhesions that are often the source of future mischief.

In addition to these means, the warm bath may occasionally be useful, or repeated fomentations to the abdomen will tend much to relieve the pain and soreness. Counter-irritation, by means of blisters, after local and general bleeding, is generally recommended; but we have not been much in the habit of employing them. While much inflammatory excitement prevails, they would prove injurious, and at any period of the disease their application would deprive us of the most important means we possess of ascertaining the degree of tenderness by pressure. The application of warm flannel dipped in turpentine we conceive a good substitute, and it will generally produce a rubefacient effect.

Oil of turpentine, which was first recommended by Dr. Brennan of Dublin, in puerperal peritonitis, may be useful internally in certain forms of the disease, but we conceive it requires to be used with caution; it acts as a powerful cathartic, and at the same time excites the general system; hence it would obviously prove injurious, while much heat of skin, frequent pulse, and indications of active local inflammation were present; but in a debilitated patient, after the acute symptoms have been subdued, or in cases of puerperal peritonitis accompanied with typhoid symptoms, or where general and local bleeding cannot, from the delicacy of the patient's constitution, be carried to the requisite extent, it may be employed with advantage.

During the whole course of our treatment, the strictest antiphlogistic regimen should be observed. Light farinaceous diet, in small quantities, and rice or barley-water for drink, are most suitable for the patient; but if symptoms indicative of a sinking of the vital powers should appear, wine and other tonics may be necessary. Dr. Abercrombie used injections of beef-tea and cinchona with advantage.

When we have carried venesection to a considerable extent, and have reduced the vascular action to such a degree as renders the abstraction of more blood inadmissible, if we still find pain and tenderness present, the exhibition of a full opiate, followed by fomentations or a warm poultice to the abdomen, will sometimes remove the symptoms. If vomiting is urgent, it may sometimes be checked by saline draughts with tincture of opium, or by leeching and blistering the epigastrium. When the pulse continues very frequent after the inflammation appears to be subdued, Dr. Abercrombie recommends the use of digitalis.

A tympanitic state of the abdomen at an advanced period of the disease may occur from mere loss of tone, after the inflammation has been subdued. Small quantities of wine or brandy may be given at short intervals. Frictions of the abdomen, and injections of beef-tea, bark, or sulphate of quinine, turpentine, or tincture of assafœtida, with a moderate quantity of laudanum, may be repeated every two or three hours. The bowels may be moved with mild laxatives, such as aloetic wine, or aloes and hyoscyamus, but laxatives require to be given with the utmost caution. The authorities for the tobacco injection in inflammation of the bowels are numerous: among others, De Haen, Fowler, Abercrombie, and Howship, have recommended this remedy; the latter author relates three cases in which, having tried bleeding, the warm bath, and stimulating injections without effect, the fume of tobacco cautiously injected caused a general commotion and rumbling noise in the bowels, which was soon followed by copious evacuations of fæcal matter. The patients were all saved. (Practical Observations, p. 19.)

During convalescence the greatest care is necessary in order to prevent a relapse. The patient should observe the strictest temperance in his diet, and return with great caution to the use of animal food or wine. The bowels should be kept regular, the feet warm, and flannel worn next the skin for a long time after every symptom has disappeared.

Treatment of Chronic Peritonitis.—Chronic inflammation of the peritoneum, when far advanced, is in most cases incurable, especially when the false membranes and other morbid productions are considerable in quantity, or when it coexists with a tuberculated state of the peritoneum or subjacent cellular texture, such substances being for the most part incapable of absorption; but where the effusion consists of serum, with but little or no solid productions, our chance of success is greater. Much will depend on arresting the disease at an early stage, at which time a degree of subacute inflammation often exists, which will require, with some modifications, the same treatment as the acute form. At every period in this disease, when the abdominal pain and tenderness are present, and the constitution of the patient is not very much debilitated, blood may be abstracted from the system to the extent of six or eight ounces at a time, which may be repeated twice a week until those symptoms have disappeared. The application of leeches also may be frequently adopted; this will be found the most effectual mode of relieving the abdominal soreness. All fæcal accumulations should be prevented, and the bowels kept regular by the gentlest aperients or enemata, but active purgatives should be avoided, as they may be productive of serious evil. The warm bath or fomentations to the abdomen may be frequently employed, and will assist much in allaying irritation and pain, and in determining to the surface. Blisters may also occasionally be applied to the abdomen, or the external application of turpentine, as recommended in the acute form, will be found useful in relieving the abdominal tenderness.

The antiphlogistic regimen is to be observed to a certain extent, and light nutritious diet, composed principally of the farinaceæ and milk, in limited quantities at a time, appears the most suitable. Muscular exertion, or pressure on the abdomen, will be found to aggravate the symptoms, and are of course to be avoided; but in some cases gentle exercise in a carriage will promote the general health. A sea voyage has been recommended, and may be useful.

During the whole course of the disease we are to guard against the supervention of acute inflammation, which may be induced by a very slight exciting cause, and is especially to be dreaded, as the patient, from his debilitated state, could not bear the evacuation which would be necessary for its removal. When the pain and soreness are mitigated, if serous effusion exists, its absorption will be promoted by diuretics. Digitalis, either in the form of infusion or tincture, may be given conjoined with the alkalis and the spirit of nitric ether; but care should be taken to excite as little irritation of the stomach or intestines as possible. We have found the ioduretted ointment of Lugol, mixed with equal parts of mercurial ointment, applied by friction to the abdomen, a powerful means of exciting absorption in cases of ascites consequent on peritonitis. In some instances it surpasses our expectation in producing the complete removal of considerable ascites in a few weeks. We have also in some cases exhibited at the same time internally the aqua mineralis iodinæ of the same author, and found it a valuable auxiliary. Broussais strongly recommends the introduction of diuretic medicines, such as the tincture of cantharides or squill, by means of friction on the skin, and it may be proper to try this mode of exciting diuresis, when, from irritability of the stomach, we cannot give diuretics internally. Anodynes may occasionally be necessary, and we should select those which do not produce constipation, such as hyoscyamus or conium. Rigid abstinence has been recommended as a means of producing absorption, (Med. Chirurg. Rev. Sept. 1820. p. 187,) and in some cases perhaps it may be tried, but it will be improper where the patient is much debilitated by a protracted disease. Where all inflammatory symptoms have subsided, and a state of exhaustion remains while the effusion continues, tonics combined with diuretics may be cautiously tried. We have in such cases derived considerable advantage from the exhibition of the ferrum tartarizatum in solution, combined with the spiritus junip. comp.: it appeared to improve the patient's general health, and excite the action of the kidneys at this period of the disease. The antiphlogistic regimen will require to be relaxed a little, and more nutritious diet in small quantities may be allowed.

D. H. Mac Adam.

VI. Peritonitis from Perforation of the Serous Membrane. — This most severe and generally fatal form of peritonitis is the result of a solution of continuity of the peritoneum, which may arise from various causes, and occur in various portions of the sac. In most cases the result of this accident is the introduction into the sac of the peritoneum of some solid or fluid substance which produces a sudden, and generally universal, inflammation, so that the principal characters of this form of disease are, the suddenness of the attack, the terrible rapidity and violence with which the disease runs to its fatal termination, and its resistance to ordinary medical treatment. It will be found that in some of the cases, the particulars of which will be detailed, all these peculiarities were not observed, but we shall find, notwithstanding, that the above characteristics will apply to the disease in general. The following are the most common causes of the accident: — 1st, external injuries, either of the solid or hollow viscera of the abdomen, or of the parietal peritoneum merely; 2dly, rupture of the bladder from distension, and of the uterus during parturition; 3dly, rupture of some portion of the digestive tube, from the gelatinous softening of its coats; 4thly, ulcerative perforation of the serous membrane, arising either from disease in any part of the subdiaphragmatic portion of the digestive tube, from suppurations of the solid viscera opening into the peritoneum; from ulceration of the bladder or ovaries; or from perforation of the diaphragm by purulent collections on its thoracic surface.

If we examine these different causes with respect to their frequency, it is plain that from the first order arise most cases of the disease. In this order,—which includes surgical operations on the peritoneum, — the introduction of irritating substances into the peritoneal cavity is by no means a necessary occurrence, although, in the case of rupture from external violence, we see the worst examples of this formidable occurrence; for, as will appear presently, the opening in such case is generally much more extensive, whereby the quantity of matter introduced comes to be greater, and the closure of the orifice much more difficult.

In the present article we shall principally consider that form of peritonitis which results from perforation of the tunics of some portion of the digestive tube,—an occurrence in the great majority of cases, the result of circumscribed ulceration of the mucous membrane and glands. The study of this form of the disease tends to elucidate those cases which arise from other causes.

It is necessary to remark, in the first place, that ulcerative perforation of the intestinal tunics does not necessarily imply a consequent effusion of the contents of the tube into the peritoneal cavity; for it may happen in many chronic and even in some acute cases, that in consequence of adhesions being formed between the two surfaces of the peritoneum, at a point corresponding to the situation of the ulcer, the contents of the tube are prevented from escaping into the general cavity. Thus, the serous membrane covering the opposite fold of intestine, or some of the solid viscera, may come to form the base of an ulcer which originally was wholly unconnected with it. Again, it may happen that this new base to the ulcer may in its turn give way, and an unnatural communication be thus formed between two essentially different portions of the tube, and the fæcal contents pass across the serous membrane, but not enter its cavity. A remarkable case of this description is described by Dr. Abercrombie. The patient, who was fifty-six years of age, had laboured for two or three weeks under impaired appetite, languor, and occasional pain in the abdomen, when he was suddenly seized, while walking, with vomiting of fæcal matter, but felt no other inconvenience until about a week after, when a similar attack recurred; he was then seen by Dr. Combe, who found him looking unwell, but with a natural pulse and good appetite. The bowels were easily regulated, and no signs of organic disease could be detected. After this time the vomiting returned at various intervals, sometimes three or four times a day, and sometimes he was

free from it a week at a time. The matter ejected always consisted of pure fæces, sometimes so consistent that it was brought up with difficulty until he diluted it by swallowing hot water. During the course of this affection, the body continued regular or easily regulated, and the matter vomited completely resembled that which was passed from the bowels. No tumour could be detected by examination; his appetite continued good, and he was never observed to vomit food or other matters taken into the stomach. In this state he lived for three months, and died gradually exhausted, without any particular change in the symptoms, except that a week before his death he vomited a considerable quantity of blood. On dissection, the stomach was found contracted and adhering to the parietes of the abdomen on the left side, and to the arch of the colon. At the place of the adhesion a soft tubercular mass was formed, which seemed in general to be about two inches in thickness. The stomach appeared externally healthy; internally it showed a mass of ulceration which occupied the whole of the great curvature, and covered about one-half of its inner surface. The pylorus and whole pyloric extremity were healthy. In the centre of the ulcerated part there was a ragged irregular opening fully two inches in diameter, which made a free communication with the arch of the colon; and around the opening there was also some ulceration of the mucous membrane of the colon. The intestines in all other respects were healthy. The small intestines were empty; the caput coli was distended with fæculent matter, and the colon throughout contained healthy well-formed fæces. (On Diseases of the Stomach, &c.) Chomel has described a case in which the duodenum communicated with the colon through the medium of the gall-bladder. (*Andral*, Précis d'Anatomie Pathologique.) In another case on record, a communication existed between two loops of intestine formed by a little canal about two lines in length and eight in width, which was lined by a mucous membrane continuous with that of the intestinal tube.

Many cases are recorded of perforating ulcers of the digestive tube communicating with the solid viscera. Thus the base of an ulcer of the colon has been found constituted by the tissue of the kidney; ulcers of the stomach have been found resting on the spleen; Rayer has described an ulceration of the duodenum, the basis of which was a portion of the liver. The effusion of the contents of the stomach from ulceration is commonly prevented by the pancreas, the substance or the peritoneal coat of which forms the base of the ulcer. In this way a perfect cicatrix may be formed, and the health of the individual be preserved.

In most of these cases of perforation without effusion, a partial and very circumscribed peritonitis ensues, which, by its adhesions, prevents the escape of the contents of the intestine. It is further to be remarked that this occurrence is commonly the result of a chronic disease, so that time is afforded for the exudation and organization of lymph. But we are not to conclude that this adhesion always takes place in chronic ulcerations; the contrary is the fact, as will be shown presently. In recent ulcerative perforations, effusion of the intestinal contents is, as might be expected, the almost constant result; but we have seen a case where not only one but several perforations, the result of recent ulcerations, occurred, and yet where no effusion of fæcal matter took place. The following are the particulars of this remarkable case.

A young woman was admitted into the Meath Hospital in the beginning of the year 1829. She had enjoyed good health until thirteen days previous to her admission, when she was attacked with cough, followed on the next day by symptoms of fever. She complained of cough and dyspnœa; there was great prostration of strength, the skin was hot, and the tongue covered with a white paste. She took saline purgatives and effervescing draughts without relief. Headach and deafness supervened.

Two days before admission she complained of pain in the epigastric region, which was removed by leeching. On the 24th of January, the day of her admission, she had intense bronchitis. Respirations 40, and pulse 130 in the minute. There was great restlessness, and the belly was tympanitic. For the next nine days all her sufferings seemed referable to the chest; but on the 2d of February she had a certain degree of tenderness in the epigastric region. This was again removed by the use of leeches, and for eleven days there was no prominent abdominal symptom; but the distress of respiration and the signs of bronchitis continued without alleviation. The exhibition of tartar-emetic was now resorted to; and though it produced vomiting, yet the thoracic symptoms improved so much, and without any sign of abdominal disorder, that great hopes were entertained of her recovery. The skin became cool, the pulse fell to 100, and the deafness gradually disappeared. On the 12th of February, however, there was a severe relapse. The thoracic symptoms became again violent, *with some epigastric* tenderness. She sank on the following day.

On dissection, the lungs were found filled with miliary and granular tubercles; in some places hepatized, and presenting signs of intense inflammation in the bronchial mucous membrane. A small quantity of sero-purulent matter was found in the cavity of the pelvis. The small intestines were glued together by flakes of unorganized lymph; and on separating their folds, we discovered four perforations, each sufficiently large to admit a quill. These corresponded to recent ulcers in the muciparous glands, which had perforated all the coats of the intestine, and, in fact, rested on the serous membrane of the opposite fold. No fæcal matter whatever was discovered in the cavity of the peritoneum.

We here see a case where, from recent disease, no less than four large perforations occurred without any fæcal effusion; a circumstance explicable by the formation of lymph around each of the orifices, which we must suppose to have taken place prior to the giving way of the serous membrane at the base of the ulcers. Accordingly, the usual symptoms of peritonitis from effusions of the contents of the intestine did not occur. The glueing together of the small intestines, and the fluid in the pelvic cavity, must be then considered as re

sulting from the extension of the different (at first local) inflammations of the serous membrane; a circumstance not to be wondered at when we consider that the disease was acute, the fever high, and the points of irritation of the serous membrane numerous. How far the latency of the abdominal inflammation is to be explained by the coexistence of intense thoracic disease, we shall not now inquire.

Peritonitis from perforation of the intestinal tube, and effusion of its contents, is, as might be expected, almost always a violent and fatal disease. It is violent, because it arises from the introduction of a highly irritating fluid into the sac, and dangerous in the highest degree from the seat of the inflammation; it is, moreover, kept up by the continued ingress of fæcal matter through the perforation, and derives further malignancy from having supervened in a subject already attacked by another disease. In fact, although in a few cases the patients have shown some power of resistance to the disease, and have lived for several days from the occurrence of the accident, yet these cases may well be considered as exceptions.

But are we to believe that the effusion of the intestinal contents is inevitably followed by a violent and acute peritonitis? A case recorded by Andral is in opposition to this opinion. It was that of a young person labouring under phthisis, through whose umbilicus a round worm (*ascaris lumbricoides*) was discharged. He lived for several weeks after this occurrence, and during each day a small quantity of fæcal matter escaped through the umbilical fistula. On dissection a chronic peritonitis was discovered, and the serous cavity contained a fetid fluid quite similar to that which had passed through the umbilicus, and in which were several lumbrici.

It is obvious that such a case as this, though of great rarity, is not without its analogies in other systems. We know that the occurrence of a pulmonary fistula is not necessarily followed by violent symptoms; that the pleuritis may be so latent as that the period when the fistula was formed shall be quite uncertain. As a general proposition, then, it may be stated that in both the peritoneum and pleura a fistula, through which foreign substances pass into the sac, may form without violent symptoms or acute inflammation. These cases, however, are exceptions to the general rule; and the cause of the absence of acute inflammation in such instances is still to be sought for. Perhaps the anæmic state of the body, as in phthisis, may have some influence.

When we examine the different diseases in which, at some period, a sudden change in the physical relations of parts takes place, we observe, in most cases, that this sudden change is accompanied by striking symptoms, the suddenness of which leads to the diagnosis. For example, the paralysis, which is the result of an apoplectic effusion, comes on suddenly; and by this is distinguished from that from softening of the brain, which comes on gradually. Again, a patient has a recognised aneurism of the aorta: if he drops down dead, the great probability is that an internal rupture of the tumour has occurred. If the signs of an abscess of the liver suddenly disappear, with copious expectoration, or with a diarrhœa, a vomiting, or a peritonitis, we diagnosticate a solution of continuity, an opening into the lungs, the digestive tube, or the peritoneum. When a tubercuious or other abscess opens into the pleura, the empyema and pneumothorax are ushered in by new and violent symptoms. The same observations apply to the diagnosis of rupture of the uterus and bladder.

Now, although cases of exception may be met with in every one of these diseases, yet they are so rare that the general applicability of the diagnosis — as drawn from the suddenness of new symptoms — is not much infringed on. Apoplexy may occur with gradual symptoms. We have already stated that a tuberculous abscess may perforate the pleura without violent symptoms, and so on. On the other hand, suddenness of invasion of new symptoms may be observed without any solution of continuity. Yet both the want of suddenness and violence of symptoms in cases of rupture, and their occurrence where no solution of continuity exists, are to be looked on as exceptions to a general rule.

We shall now detail some examples of peritonitis from perforation of different portions of the digestive tube. "A young woman, aged eighteen, had been affected for about six months with variable appetite and occasional pain in the stomach, which made her frequently sit with her body bent forward, and her hand pressed upon the epigastric region. Little notice was taken of the attacks, as she was going about, and otherwise in good health; and for some weeks previous to the attack now to be described, her appetite had greatly improved. On the 26th of November, 1824, while in a room by herself, she was heard to scream violently; and when a person went into the room, she was found unable to express her feelings, except by violently pressing her hand against the pit of the stomach. When she was soon after seen by Mr. M'Culloch, she was moaning as if in extreme agony, but was unable to speak. The pulse was 86, and very weak. She could scarcely swallow; but soon after vomited the contents of the stomach, which seemed to be merely food which she had recently taken. Various remedies were employed without relief. She continued with every appearance of extreme suffering till seven o'clock in the morning of the 27th, when she said the pain was considerably easier, but was still very severe in the pit of the stomach, and was extending downwards over the abdomen. The abdomen was now becoming distended; and when we saw her, about three o'clock in the afternoon, it was distended to the greatest degree, and very tense. The pulse was extremely feeble; she was scarcely able to speak, but her countenance was expressive of extreme suffering. Nothing afforded the smallest relief, and she died about two in the morning—twenty-nine hours from the attack. *Inspection.*—The cavity of the peritoneum was distended with air, and likewise contained upwards of eight pounds of fluid of a whitish colour and fetid smell. There was slight but extensive inflammatory depositions on the surface of the intestines, producing adhesions to each other and to the parietes of the abdomen. On the upper part of the small curvature of the stomach near the cardia, there was a small perforation of

a size which admitted the point of the little finger. Internally, this opening communicated with an ulcerated space on the mucous membrane about the size of a shilling, with slightly thickened and hardened edges, and a considerable perpendicular loss of substance. The stomach in all other respects was entirely healthy." (Abercrombie, Researches on the Diseases of the Stomach, &c. p. 35.)

We have given this case at full length, as it may be considered as an example of the mode of inflammation of the serous membrane in these cases, both as to invasion and termination. In this case, and in some to which we shall just now allude, the perforation was the result of a chronic but circumscribed irritation. In another case described by Dr. Abercrombie, the peritonitis suddenly supervened in a subject apparently affected with chronic dyspepsia, in which the prominent symptoms were severe pyrosis and occasional vomiting. In consequence of a careful regulation of regimen, the stomach had recovered its healthy functions, and the patient's general health had become excellent; but he was obliged to observe great caution in regimen, from the occasional recurrence of slight attacks of his former symptoms. During one of these slight attacks, he was suddenly seized with excruciating pain in the pit of the stomach, some vomiting, coldness of the body, and a small frequent pulse. No relief was afforded by treatment, and death took place in thirty hours from the attack. On dissection, extensive recent peritonitis was shown, and a perforating ulcer of the stomach near to the pyloric portion. The stomach, with the exception of the perforating ulcer, and another, the base of which was formed by the surface of the liver, was perfectly healthy. (Op. cit. p. 37.)

In this case there can be little doubt of the connection between the primary symptoms and the ulcer, the base of which was formed by the surface of the liver; and in all probability there would have been a permanent cure, had not the second ulceration occurred.

In almost all the cases of this form of peritonitis, resulting from a perforation of the stomach, symptoms of a chronic disease of this organ had preceded the accident for a greater or less space of time. Of these, local pain and vomiting were the most frequent, but the degree of severity of these symptoms, and their effect on the general health, were exceedingly various. In some of these cases a cancerous ulceration existed; in others, the affection of the stomach was a simple circumscribed ulcer; while in a third class, the disease was the gelatinous softening (*ramollissement gelatiniforme*) of the French authors.*

The immediate cause of the accident in by far the greater number of these cases, was the progress of the destructive process; but in two, the effort of vomiting seemed to be the cause of the solution of continuity. Andral describes a case of an individual who laboured under the symptoms of a cancerous disease of the stomach, and who was suddenly seized with peritonitis during the act of vomiting, which had been brought on by an emetic. On dissection, a perforation of the stomach was found in the centre of an old ulceration of the stomach. (Précis d'Anatomie Pathologique, tom. ii.)

In another case on record, an old ulcer had existed, and had formed adhesions with the pancreas. The perforation took place during the efforts at stool, and was found to have occurred at one of the extremities of the above-mentioned ulceration. (*Bouillaud*, Archives de Médecine, tom. i.)

It is admitted that in some cases a perforation of the stomach takes place in individuals who were in the enjoyment of the best health; and that on dissection no evidence of a previously existing *ulceration* of the organ could be found. Here the absence of gastric symptoms, previous to the fatal attack of peritonitis, is not extraordinary. But even a fatal ulceration of the stomach may occur with singular latency, as in a case recorded by Dr. Abercrombie, where, in a strong and healthy-looking girl, sudden and rapidly-fatal peritonitis supervened. On dissection, a perforating ulcer was found in the smaller curvature, all around which the coats of the stomach were found greatly and extensively thickened. *This girl had been residing in the house in which she died for four months, during which she was never known to complain of her stomach, or to show the smallest deviation from the most robust health.* (Op. cit. p. 41.) It appeared, however, that she had had fever some months before this; and in all probability this fever was symptomatic of, or connected with, a gastritis.

We shall now proceed to examine what appears to be the most common case of this disease, namely, that in which it supervenes on a perforating ulcer of the lower portion of the ileum. In the great majority of these cases, the ulcerations were recent and the disease acute. In many of them, symptoms of a previous excitement of the muciparous glands were observed.

As Louis is the author who has drawn the attention of pathologists more especially to this disease, we cannot do better than quote from his memoir (Recherches Anatomico-Pathologiques. Paris, 1826) the results of his observation of the first eight cases which he describes. "The patients who have been the victims of this disease were young and vigorous, with the exception of the first, who was weak and of a lymphatic temperament; they had a good constitution, were rarely ill, not addicted to excess, and presenting a sanguine, a bilious, or a lymphatigo-sanguine temperament. Almost all had been but a short time in Paris. The causes of their disease were unknown. If we except a single case, it commenced as a slight, continued fever, and presented no severe symptom before the period of the perforation; in but one patient was there a severe diarrhœa, which was, however, of short continuance; in another, it had been moderate; still less in the subjects of the second and sixth cases, and not occurring in the remainder. Those with whom the diarrhœa was for a short time severe, had slight pains in the epigastrium and more severe pain in other portions of the abdomen, while in the remainder they were very slight, or not at all pre-

* See *Gerard*, Des Perforations Spontanées de l'Estomac — *Travers*, Medico-Chirurgical Transactions — *Crampton*, Ibid.—Journal Gen. de Medecine, 1821.—Dr. *J. Crampton*. Transactions of the Association of the King's and Queen's College of Physicians, vol. i.

sent before the period of perforation. Three of them believed themselves convalescent, and were considered so for some days, when the symptoms of this lesion occurred. A fourth seemed to have been cured rapidly of a slight enteritis; so that not only in these four subjects nothing occurred which could lead to the anticipation of the disease under which they sank, but it would have been absurd, from the mildness of their symptoms, to have apprehended any serious consequences. And at this moment we have before us the history of many patients who have died from an acute perforation of the intestine, and who, with this exception, presented no symptom which could distinguish them from analogous cases where there was a rapid return to health.

"If the period of the formation of these ulcerations cannot be accurately determined, we shall scarcely be far from the truth in supposing that it coincides with the first symptoms of the disease, from which it would result that the progress of these ulcerations has been very rapid, and that they have arrived at their last period in from twelve to twenty-five days, rarely later.

"At a certain period of the disease, on account of which the patients had entered the hospital, they experienced suddenly an exquisite and tearing pain of the abdomen, rapidly followed by alteration of the features, nausea and vomitings, &c. &c. These symptoms continued with greater or less violence from twenty to fifty-four hours, presenting remissions which were more or less well marked, and indicating a most intense peritonitis, produced by a violent cause acting in a sudden manner, just as occurs when an irritating substance is applied to the surface of the peritoneum. It is by the reunion of these signs that the lesion that now occupies us has been recognised by MM. Lerminier, Chomel, and Martin Solon, under whose care the patients were. From these circumstances it appears that we may regard the following as characteristic signs of perforation of the intestine: *if in an acute disease and in an unexpected manner a violent pain of the abdomen suddenly supervenes, if this pain is exasperated by pressure, accompanied by rapid alteration of the features, and more or less promptly followed by nausea and vomiting, we may believe and announce that there is a perforation of the intestine.*"

This author further remarks, that the most intense pain of the belly suddenly supervening, and accompanied by alteration of the countenance, nausea and vomiting, will be insufficient to allow us to make this diagnosis with certainty, unless the pain is exasperated by pressure. It is not only necessary that this character should exist, but also that the pain shall extend rapidly to the whole abdomen, so that, if it remains confined to the point where it has first occurred, we cannot, notwithstanding the coincidence of other symptoms, declare that the intestine is perforated, or that any other viscus has opened into the cavity of the abdomen. In illustration of this he states the case of a man who had laboured under symptoms of chronic gastritis, when he was suddenly attacked with violent pain in the epigastrium, soon followed by nausea, vomiting, and alteration of the countenance. This pain, which was exasperated by pressure, was confined to a very small space, where it first occurred. It continued, along with the other symptoms, for four days, when the patient died, and on dissection was found to proceed from an aneurism of the cœliac artery, which had ruptured, and caused an effusion of blood behind the peritoneum.

It is not always that the pain, though occurring under the above circumstances, continues until death. In one of the cases of this lesion, which occurred at the Meath Hospital, there was complete cessation of pain and even of tenderness for many hours before death. The patient declared himself much better, yet the other symptoms of peritonitis continued, such as the coldness of the extremities, the rapidity of the pulse, the swelling of the belly, and the Hippocratic expression. In three of Louis's cases the same circumstance was observed; the countenance continued altered, the nausea and vomiting persisted, the surface was pale and of a violent hue, and the patients were perpetually shivering and covering themselves carefully up in the bed-clothes. They resembled persons who, having taken a cold bath, cannot again regain warmth.

We may be further assisted in the diagnosis of perforation of the small intestine by the seat of the pain as it first occurs. This is generally in the ileo-cœcal region; but it may no doubt be felt in other situations, according to the place of the perforation and the disposition of the intestine.

We have now witnessed a considerable number of these cases, which occurred under our observation in the wards of the Meath Hospital. In nine of these cases the diagnosis of perforation of the intestine was made, and proved to be accurate by dissection. It is scarcely necessary to remark that the general features of these cases were the same, namely, *the sudden supervention of the symptoms of peritonitis, and the rapid sinking of the vital powers.*

In three cases, the serous inflammation supervened during the existence of gastro-enteric fever more or less well marked.

In one case, the symptoms came on on the seventh day of a catarrhal fever.

In two cases, the disease occurred after symptoms of acute enteritis, which in one of the cases followed a severe debauch.

In one case (which we have before mentioned), the perforations, though numerous, yet did not produce any well-marked symptoms, the patient dying apparently of acute phthisis.

In one case, the symptoms occurred after an hypercatharsis induced by an over-dose of salts. The same cause appeared to produce the disease in another patient, who recovered under the use of large doses of opium, and to which we shall hereafter allude.

In several of these cases there had been previous diarrhœa, which was suddenly checked at the time when the perforation appeared to take place; but in one of them in which this had occurred, a copious purging of natural coloured fæces came on twelve hours before death. This patient had used calomel freely the day before.

Another remarkable symptom was the irritation of the bladder, showing itself by sudden inability to pass urine, and constant efforts at micturition

This irritation of the urinary organs occurred in several cases, and in two was the very first symptom observed. The bladder was found inflamed in one case; while in another it was merely contracted and empty, with its mucous membrane pale. This was remarkably the case in a patient who was admitted in December 1830. This man had enjoyed uninterrupted good health until three days previous to admission, when, on getting up in the morning to gratify the extreme desire to pass water, he found himself unable to do so, the attempt putting him to intolerable torture; he had pain in the region of the bladder, not so severe when he was not attempting to pass urine. The pain continued during that day, but towards night became more easy, and he passed about ten ounces of urine; still all the attempts at micturition were attended with considerable suffering. On admission he presented the general appearance of a person affected with peritonitis: he had acute pain in the right lumbar region, and great tenderness in the umbilical, right iliac, and hypogastric regions. What he complained of principally was retention of urine; yet the catheter showed that the bladder contained but a few drops of turbid high-coloured urine, and that the urethra was unobstructed. Towards evening, after the use of an injection and venesection, he passed a small quantity of urine, the countenance was Hippocratic, and the patient died at three o'clock on the following morning. On dissection, the usual appearances of peritonitis from perforation were seen. The perforating ulcer existed about eighteen inches from the ileo-cœcal valve. Three other ulcers existed lower down, which had not made their way into the serous cavity. The peritoneal surface of the bladder was highly inflamed.

In another case, where the symptoms succeeded a bilious diarrhœa, the sudden supervention of the pain was also accompanied by inability to pass urine. On dissection, the perforation was found large and corresponding to the fundus of the bladder. And in a third case, in which the disease appeared on the seventh day of a catarrhal fever, the first symptom of the perforation was sudden inability to pass urine. In this case a turpentine enema opened the bowels, and enabled the patient to empty his bladder. Here the opening existed about three inches above the ileo-cœcal valve, and the mucous membrane of the bladder was found highly inflamed.

In all our cases, evidences of a previously diseased condition of the mucous glands of the intestine existed to a greater or less degree; in some instances accompanied by functional disturbance, in others occurring in a perfectly latent manner. Of this last remarkable fact many other instances have been observed by authors.

The peritonitis thus supervening, as might be expected, almost always runs its course in a very short time. In the first nine cases recorded by Louis, death took place in from twenty to fifty-four hours, while in one case the patient lived seven days from the first appearance of the symptoms of peritonitis. In this instance the symptoms, which had been violent at first, became moderated at the commencement of the fourth day, and during the remaining three days the pain of the belly was very slight, and if the first symptoms had not been so well marked, doubts would have been entertained of the truth of the diagnosis. "In confirming," says Louis, "those diagnostic symptoms which we have established, this observation is of great importance as connected with prognosis, since it shows that when once the signs of perforation have occurred, we must not depart from our diagnosis and admit of hope even after an arrest of symptoms, and an apparent amelioration even of some days standing. This reserve is furthermore necessary from the fact that the lesion that brought about the perforation is not so soon arrested, and that the first perforation may be followed by a second, and even by a third. (Obs. vi. and vii.) This prolongation of life after so severe an accident is in accordance with the variations which we so constantly observe in the march of diseases, and points out the analogy between perforations of the intestines and those of the lung."

In our cases the length of time the patients lived after the occurrence of the perforation, varied from twelve to one hundred and twenty hours. We find, on examining the results of nineteen cases observed by ourselves, or recorded in the works of different authors, in which the period of the perforation could be accurately ascertained, that the average length of time that the patients lived after this accident was about twenty-nine hours. In one of our cases, however, which we have brought into this calculation, the patient lived about one hundred and twenty hours; and in a case recorded by Louis, the perforation took place on the 18th of May, and the patient lived until the 25th of the same month. The shortest period in which the fatal termination took place seems to be in six hours. We may observe, that in some of the cases which have entered into the above calculation, the perforation occurred in the stomach, and in one in the duodenum.

We have hitherto been principally occupied with those cases of peritonitis from perforation in which the symptoms were well marked, and in which the intestinal contents passed into the cavity of the peritoneum. It is a fact, however, that in a very few cases this accident may supervene without the ordinary sudden and violent symptoms: thus, in the ninth observation of Louis, we read of a patient who was labouring under fever with diarrhœa, in whom the symptoms which appeared to correspond with the perforation were delirium and shivering, which occurred in the morning and continued till the evening of the next day, when the patient sank; there was also increased meteorism, and the patient winced only after a strong pressure of the belly. In this case the perforation was not suspected, yet Louis inquires whether we might not, under similar circumstances, suspect a perforation of the intestine, particularly when it is considered that peritonitis without perforation is rare as occurring in the course of acute diseases. He thinks that if, in the course of a continued fever with diarrhœa, the patient is seized with delirium, shiverings, and a slight tenderness of the belly, which until then had not been painful, we might be authorised to suspect a perforation of the small intestine.

In the case of the young phthisical patient recorded by Andral, through whose umbilicus a

round worm (ascaris lumbricoides) was discharged, the individual lived for some weeks after this occurrence.

It must be always borne in mind that the diagnosis of peritonitis from perforation of the intestine in ordinary cases, is founded on the greater probability that the peritonitis thus suddenly supervening proceeds more from the introduction of irritating matters from the intestine than from any other cause. It is plain also, that so far as the peritonitis is concerned, we shall observe the same general symptoms in cases of the rupture of abscesses into the peritoneal cavity, or the effusion of urine from rupture of the bladder; but still a few cases may occur where a sudden and fatal peritonitis may supervene without solution of continuity of the serous membrane of the peritoneum. We need scarcely allude to strangulated hernia further than to observe that, where the strangulated portion is exceedingly small, so as not to be capable of detection by external examination, the case may closely resemble one from sudden perforation of the intestine. Of this we witnessed a very remarkable case, where a portion of the intestine not larger than a small hazel-nut had become strangulated. The symptoms supervened with sudden pain, constipation, swelling, tenderness of the belly, and the other signs of peritonitis.

In the article Hepatitis we have described a case of peritonitis from the opening of an hepatic abscess into the serous membrane; in this case the patient lived for eight days after the occurrence of the perforation; and on dissection we found the false membrane of the peritoneum in progress of organization, as shown by the existence of large blood-vessels of a deep blue colour passing through its substance, which had assumed a laminar structure.

It is scarcely necessary to remark, that the prognosis in peritonitis from the introduction of irritating substances into the cavity, must be unfavourable in the highest possible degree, for two reasons; — first, from the nature of the exciting cause, which produces a rapid and universal inflammation; and, secondly, from the previous existence of some other disease which was the cause of the perforation. Yet we believe that even under these almost desperate circumstances, we are not justified in abandoning the patient to his fate without an attempt to save life by medical treatment. We know that the peritoneum may recover from inflammation after solutions of continuity in various portions of its extent, and hence this circumstance merely, though dangerous in a great degree, is not necessarily to lead us to despair. It would seem that it is from the introduction of irritating matters into the cavity that the greatest danger is to be apprehended, and hence to prevent or diminish the extent of such an accident should be the principal object of the physician. In cases of this description the principles of treatment are, then, essentially different from those of ordinary cases of peritoneal inflammation.

In the second number of the Dublin Journal of Medical and Chemical Science, the writer of this article has shown the inapplicability of the ordinary mode of treatment of peritonitis in those cases. In most of them the powers of life sink so rapidly that bleeding, either general or local, cannot be attempted; neither can we use mercury internally, from the danger of exciting the peristaltic action of the intestine, which of course tends to keep open the communication, and causes a fresh ingress of fæcal matter into the sac; nor can we hope much from the external application of mercury, from its slow action, and the improbability of its affecting the system under these circumstances.

Yet, in a few cases, we find that the patients may live for several days, and that a process of organization of the effused false membrane may be found to have commenced; and hence the two great indications are, to support the strength of the patient so as to gain time, and to diminish, as far as possible, the peristaltic action of the intestine. In the paper above alluded to, we have proposed the use of opium in large doses for the treatment of this form of the disease, to which we were led from having witnessed the admirable effects of that remedy in low cases of peritonitis in the hands of Dr. Graves, who, eleven years ago, treated successfully two cases of peritonitis after paracentesis, and occurring in patients of a bad habit, by means of opium in free doses, and without abstracting a drop of blood. The same physician employed a similar treatment in a case of abscess of the liver opening into the peritoneal sac, and with success, as far as the cure of the peritonitis was concerned. (See Dublin. Hos. Reports, vol. 5. Dublin Journal of Medical and Chemical Science, vol. 2.)

In the paper above alluded to, we have detailed two cases, in which decided evidence of the utility of this mode of treatment was obtained. In the first, in which the symptoms of perforation had existed for two days, and the patient was in almost complete collapse, the use of sixty drops of the black drop in the twenty-four hours, was followed by most singular improvement: the pulse had become full and soft, the extremities warm, and the countenance had lost the Hippocratic expression. The patient could bear pressure on the abdomen, which the day before was exquisitely painful. The same treatment being continued for twenty-four hours longer, *every symptom of abdominal inflammation had subsided:* the belly was natural and the pulse good. At this period the mildest possible saline laxative was exhibited, which produced four evacuations, followed by an immediate return of the symptoms of peritonitis, under which the patient rapidly sank. On dissection, we found universal peritonitis, but the intestines were every where agglutinated together, except in the left iliac fossa. The perforation existed in the cæcum, and was small; and the mucous membrane of the ileum and colon was but little affected.

The interest of this case consists, first, in the decided advantage derived from the use of the opium; secondly, in the danger it shows to result from any thing that excites the peristaltic action of the intestine; and thirdly, in the verification of the diagnosis of perforation, and the evidence of a process of cure having commenced.

In the next case the disease was of three days' standing, and it supervened suddenly from a hypercatharsis, produced by an over-dose of Glauber's salts. The patient was apparently in the

last stage when the opium treatment was commenced. He was ordered a grain of opium every hour. Next day the symptoms were decidedly improved, and though he had taken twenty-four grains, he had not experienced the slightest coma, headach, or delirium. The same plan of treatment was persevered in, the daily doses of opium being gradually diminished until the tenth day, when the convalescence being completely established, the remedy was omitted. During this time, diarrhœa set in for three or four days severely; this was treated by the application of a few leeches to the anus, and the use of anodyne enemata. The patient took in all one hundred and five grains of opium, exclusive of that in the injections, without experiencing any of the usual effects of this remedy in large doses.

When we connect these facts, and recollect that, in bad forms of peritonitis, such as that occurring after paracentesis in debilitated subjects, it has been found successful, and also that its efficacy has been proved in a case where the peritonitis supervened on the introduction of the matter of an hepatic abscess into the peritoneum, it seems justifiable to recommend the exhibition of opium in free doses in cases of peritonitis from the introduction of irritating matters into its cavity. Of these cases, that from ulcerative perforation of the intestine seems to be the one most likely to be benefited by such a treatment, as in these cases the solution of continuity is but of small extent, the disease from which it has originated much more often acute than chronic, and generally confined to a small extent.

It is necessary to remark that in the treatment of these cases, the strength of the patients must be supported, and the greatest caution observed, even for some time after the symptoms of peritonitis have subsided, in the use of any thing that can excite the peristaltic action of the intestine.

WILLIAM STOKES.

PERTUSSIS. See HOOPING-COUGH.

PHARYNGITIS. See THROAT, DISEASES OF THE.

PHLEBITIS. See VEINS, INFLAMMATION OF.

PHLEGMASIA DOLENS. Some of the hypothetical names which have, up to the present time, been employed by authors to designate the disease which forms the subject of this article, are —*Œdema Lacteum, Œdème des Nouvelles Accouchées, Dépôts Laiteux, les Infiltrations Laiteuses des Extrémités Inférieures, Hysteralgia Lactea, Metastasis Lactis.* As it has been demonstrated by the researches of recent pathologists that the swelling of the affected limbs, and all the other local and constitutional symptoms of this affection, invariably depend on inflammation of the iliac and femoral veins, we propose to substitute the term *crural phlebitis* for phlegmasia dolens, and the other names which have now been mentioned and were in general use before the true nature of the disease was ascertained.

We shall consider *crural phlebitis* as it is observed, 1. in puerperal or lying-in women; 2. in women who have not been pregnant; 3. in the male sex.

1. CRURAL PHLEBITIS IN PUERPERAL WOMEN.—In the works of Hippocrates, Rodericus a Castro, and Wiseman, we find obscure notices of this disease. Moriceau was, however, the first author who distinctly pointed out its characteristic symptoms, and he referred the swelling of the lower extremities to a reflux upon the parts of certain humours which ought to be evacuated by the lochia, of which he says, "le gros nerf de la cuisse s'abrouve quelquefois tellement, qu'il en peut rester a la femme une claudication dans la suite." (Traité des Maladies des femmes grosses, tom. i. 1688, p. 446.) It is not improbable, from the manner in which Moriceau has expressed himself in this passage, that he had actually felt with the finger the indurated and inflamed femoral vein in the upper part of the thigh, which he mistook, however, for a nerve, as some other observers seem to have since done, for an inflamed absorbent. When the disease was accompanied with great fever, difficulty of respiration, pain, and tension of the abdomen, he considered the affection to be dangerous in proportion to the severity of these symptoms.

A more full account of crural phlebitis was published not long after Mauriceau, by Puzos and Levret, both of whom considered the swelling of the limbs to depend on a deposit of milk in the part.

Puzos states that it is a painful and protracted, and sometimes a fatal disease, and that it occurs most frequently about the twelfth day after delivery, though sometimes as late as the sixth week. He also observed that one limb only is at first affected, and that the pain and swelling commenced in the groin and superior part of the thigh, and descend along the course of the crural vessels to the ham, and thence along the calf of the leg to the foot. He observed, likewise, that the disease attacked the other limb, and that it presented the same appearances as the first affected. The extent of the mischief, he remarks, is readily recognised by a painful cord formed by the infiltration of the cellular tissue which accompanies the crural vessels. "C'est dans l'aine et dans la partie supérieure de la cuisse, que le dépôt commence à donner des signes de sa présence par la douleur que l'accouchée y ressent; et la douleur suit ordinairement le trajet des gros vaisseaux qui descendent le long de la cuisse; elle est même plus vive dans tout ce trajet. On reconnoit l'etendue du mal par une espèce de corde douloureuse que forme l'infiltration du tissu cellulaire qui accompagne ces vaisseaux, et l'enflure se joint presque toujeurs à la douleur." (Traité des Accouchemens, 4to. p. 350. Paris, 1759.) Puzos recommended repeated venesection, cathartics, and sudorifics, and various local applications, as warm fomentations, and embrocations of oil of almonds with ammonia.

Levret's description of crural phlebitis strikingly coincides with that of Puzos, and he refers the disease to the crural vessels in so direct a manner that it is singular he did not discover its precise nature. When the disease attacks one side, a tumour more or less considerable, he observes, is found on examination in the iliac fossa. The cord of crural vessels is also painful through a great part of its course. "On distingue même

souvent, dans toute son étendue, de petites tumeurs olivaires qui l'entourent ça et là." (L'Art des Accouchemens, p. 932, 2d ed. Paris, 1761.)

In a manuscript copy of Dr. William Hunter's Lectures, taken in 1775, no account is given of this disease; but from the following note, written by Mr. Cruikshanks to Mr. Trye, at the time he was engaged in the publication of his work on the subject, it is evident that Dr. Hunter had seen cases of crural phlebitis, and was convinced that the opinions of Puzos and Levret respecting the nature of the disease had no solid foundation. "They have imputed the swelled leg, which happens after lying-in, to a dépôt de lait, but it is not: to something wrong in the constitution; the patient is first seized with pain in the groin, the pulse becomes smart, and the part becomes tender, the pain and tenderness get gradually lower down, and the muscles are stiffened into hard bumps, and an œdema frequently succeeds the inflammatory swelling. It is generally called a cold, but it is not. In some it is over in a short time, in others it will last some months; it generally does well."

In the year 1784, Mr. White of Manchester published an "Inquiry into the nature and cause of that swelling in one or both of the lower extremities which sometimes happens to lying-in women," and he suggested or adopted the opinion that the disease depends on obstruction, detention, and accumulation of lymph in the limb, or on some other morbid condition of the lymphatic vessels and glands of the affected parts. He considered it to arise from some local accident during labour, and to be a purely local disease. Mr. White saw fourteen cases, either during or subsequent to the attack; but as none of them proved fatal, an opportunity was not afforded him to determine the truth of his hypothesis by an examination of the actual condition of the different textures of the affected extremities.

An essay on the swelling of the lower extremities incident to lying-in women was published in 1782, by Mr. Trye, of Gloucester, in which he referred the symptoms to rupture of the lymphatics as they cross the brim of the pelvis under Poupart's ligament. Six cases came under the observation of Mr. Trye, and in all recovery likewise took place. He clearly perceived, although he was not able to explain the fact, that an intimate relation subsists between puerperal fever and the swelled leg of lying-in women. Dr. Ferriar soon after maintained, without the slightest evidence, that there is a general inflammatory state of the absorbents in this disease.

Dr. Hull published an essay on phlegmasia dolens in 1800, in which he satisfactorily showed that it was impossible to account for the phenomenon of the disease on the supposition that the lymphatics were affected independently of a considerable primary affection of the sanguiferous system of the limb. He considered the proximate cause to consist in an inflammatory affection producing suddenly a considerable effusion of serum and coagulating lymph from the exhalants into the cellular membrane of the limb. All the textures, muscles, cellular membrane, lymphatics, nerves, glands, and blood-vessels, he supposed to become affected. (An Essay on Phlegmasia Dolens, by John Hull, M. D. Manchester, 1800.)

It is a remarkable circumstance in the history of crural phlebitis, that nearly a century and a half should have elapsed from the time when it was first clearly pointed out by Mauriceau, before an opportunity was presented of ascertaining by dissection the precise nature of the disease. There had indeed been opportunities to determine the accuracy of the different hypotheses which had been advanced, but these were neglected, and the seat of the disease and its commencement in the uterus were imperfectly understood until the writer of this article ascertained by dissection the true nature and origin of the complaint. (Pathological Researches on Inflammation of the Veins of the Uterus, Med. Chirurg. Trans. vol. xv. 1829.)

In January, 1823, M. Bouillaud related several cases and dissections in which the crural veins were obliterated in women who had suffered from a swelling of the lower extremities after delivery; and M. Bouillaud distinctly stated that he considered obstruction of the crural veins to be the cause, not only of the œdema of the lower extremities in lying-in women, but of many partial dropsies.

"Elizabeth Perfu, æt. 38, was received," he says, "into the Hospital Cochin two months and a half after her delivery. She had tuberculous phthisis, and the left lower extremity was infiltrated with serum. She died in three months, and on opening the body the veins of the affected extremity were found plugged up with a very old, red-coloured, easily broken-down fibrinous coagulum, which extended into the common iliac vein. The vena cava and the other veins were healthy, and contained more or less liquid blood."

Marguerite Colliere, æt. 30, was delivered by the forceps in the Maternité, about the end of January, 1822. She entered the Hospital Cochin on the 20th March following, having the left lower extremity greatly swollen and infiltrated with serum. She died on the seventh day after. An enormous abscess was found in the pelvis, which appeared to have commenced on the left side of the cavity before and within the psoas muscle. All the surrounding parts were extensively disorganized. The coats of the left iliac veins were thickened, and their interior layers were altered in structure, and converted into a lardaceous substance. The whole of the veins of the inferior extremity were plugged up with a solid friable clot.

M. Bouillaud observes that Chaussier and Meckel had both before related cases of swellings of the lower extremities in puerperal women, where the crural veins had been found inflamed and obstructed. (Archives de Médecine, tom. ii. Janvier, 1823.)

In May, 1823, the valuable essay of Dr. Davis on Phlegmasia dolens was read before the Medical and Chirurgical Society, subsequently published in the twelfth volume of the Transactions. Although the cases of M. Bouillaud were published four months before Dr. Davis's paper was read, it does not admit of dispute that Dr. Davis was the first who proved by dissection that phlegmasia dolens depended on inflammation of the iliac and femoral veins. So early as 1817 a fatal case occurred to him, which was examined by Mr. Lawrence, in which the iliac and femoral

veins were found inflamed and obstructed. Two other cases were recorded by Dr. Davis, and another by Mr. Oldknow, in all of which there were proofs of the previous existence of inflammation of the crural veins. (Med. and Chirurg. Trans. vol. xii. 1823.)

For six years after the publication of the cases of M. Bouillaud and Dr. Davis, pathologists remained in doubt whether these cases should be considered as examples of genuine phlegmasia dolens, or be viewed as essentially different diseases, and analogous in their nature to those formidable attacks of phlebitis which sometimes succeed to venesection and wounds. In opposition to the views of Dr. Davis, it was forcibly urged that if phlegmasia dolens depended on inflammation of veins, three out of four patients would die; whereas death does not take place in one case in an hundred where that disease is distinctly marked. Even that distinguished pathologist, Mr. Lawrence, who had examined the first fatal case which occurred to Dr. Davis, declared in the Medical and Chirurgical Society, as late as 1828, that he was fully convinced from what had subsequently fallen under his observation, that Dr. Davis's views were incorrect, and that phlegmasia dolens did not arise from inflammation of the iliac and femoral veins. Dr. Davis has communicated no additional information on the subject since 1823, and he is still of opinion that the inflammation commences in the common iliac, and not in the veins of the uterus, and that the disease is produced by the pressure of the gravid uterus during pregnancy.

In none of the cases of Dr. Davis does it appear that any attempt was made to trace the hypogastric veins to the uterus, though it is now certain, from what is known respecting the progressive changes witnessed in cases of phlebitis, that the alteration of structure which he has described must have originated in the veins of the uterus.

Thus, then, none of the writers who have been hitherto quoted have made any allusion to phlegmasia dolens commencing in the uterine veins; and even Mr. Velpeau, the latest continental author on the subject, has given it as his opinion that the affection of the veins is not the primitive disease, but is the consequence of the inflammation and suppuration of the articulations of the pelvis, with which he observed it to be frequently combined. The puriform fluid found within the veins he supposes to have been introduced into their cavity by absorption, and not to have been the effect of inflammation, nor the cause of those affections of the articulations, which is now known to be the case. How far this opinion was incorrect, we need not now point out.

It is due to Mr. Guthrie to mention, that in a paper on inflammation of veins after amputation, published in the Medical and Physical Journal for 1826, he suggested the importance of tracing the veins from the common iliac of the affected side down to the uterus, and expressed a suspicion that the disease would be found to originate in that organ.

All the authors who have treated of phlegmasia dolens describe it as commencing, in the great majority of cases, subsequent to the tenth day after parturition, with symptoms of uterine irritation and constitutional disturbance of a low typhoid character, and with pain and swelling in one extremity only. They have assigned various reasons for these remarkable peculiarities, in the period and mode of development of the disease, as pressure of the gravid uterus on the iliac veins during gestation, the change in the distribution of the blood from the sudden removal of this pressure, exposure of the extremity to cold, suppression of the lochia, deposits of milk in the limb; all of which, taken singly or combined, are insufficient to account for the phenomena; and the occurrence of the disease after menstruation, abortion, and the malignant affections of the uterus, proves that these causes are neither necessary nor sufficient for its production.

The numerous cases and dissections of which the writer of this article has published detailed histories in the Medical and Chirurgical Transactions, and in a recent work on the "Pathology and Treatment of some of the most important Diseases of Women," offer a more satisfactory, and, he trusts, a conclusive explanation of the phenomena. They demonstrate, that if inflammation be excited in the uterine branches of the hypogastric veins, it may continue to spread along these until it reaches the common external iliac and femoral veins, and by the morbid changes induced in them give rise to all the subsequent symptoms.

The two following cases are here introduced, not merely because they were the first in which crural phlebitis was distinctly traced into the uterine veins, but as they afford good examples of this affection in its most mild and most severe forms, and illustrate, better than any general description could do, the phenomena of the disease, and the alterations of structure produced by inflammation in the hypogastric and crural veins.

A patient of the British Lying-in Hospital, who had been suffering for some weeks before delivery (May 8, 1829) from the usual symptoms of tubercular phthisis, experienced, on the 4th June, a sense of soreness in the left groin, which gradually extended along the inner surface of the thigh to the ham, and from thence along the posterior surface of the leg to the foot. She stated that for two days before the occurrence of pain in the groin, she had felt great uneasiness in the region of the uterus, that this suddenly quitted the hypogastrium and passed into the groin, and that from thence it extended downward along the inner surface of the thigh to the leg. The limb became swollen twenty-four hours after the invasion of the disease.

The whole left inferior extremity is now affected with a hot, painful, colourless swelling, no where pitting on pressure, except over the foot. The thigh is fully double the size of the other, and any attempt to move the limb produces excruciating pain along the inner surface of the thigh; and the pain excited by pressure along the tract of the femoral vein is so acute, that the condition of the vessel cannot be ascertained. Several branches of the saphena major, above the knee, are distended and hard; pulse 120; respiration quick and laborious; tongue peculiarly red and glossy; diarrhœa continues. 10th. Pulmonary affection aggravated. The limb continues extremely painful, and is still more swollen. The groin is so tender that she

cannot bear the slightest pressure over it. The same is the case with the inner surface of the thigh. The branches of the saphena are still hard and painful. 11th. The femoral vein under Poupart's ligament can now be felt indurated and enlarged, and it is exquisitely painful when pressed; as is the inner surface of the thigh, the ham, and the calf of the leg. There is comparatively little tenderness along the outer surface of the limb. 17th. Diarrhœa, emaciation, colliquative sweats, and difficulty of respiration increasing. The left inferior extremity is still much swollen; but there is less pain in the groin and in the course of the femoral vessels. Died on the 24th.

Dissection. — Thorax. Adhesions between the pleuræ on both sides. Scarcely a portion of lung could be observed which did not contain tubercles in various stages of their growth. The right and left superior lobes contained several large tuberculous excavations. The vena cava and right common and external iliac veins were in a sound state. The *left common external* and *internal iliac* veins were all impervious, and had undergone various alterations of structure. The common iliac, at its termination, was reduced to a slender tube, about a line in diameter, which was lined with a bluish slate-coloured adventitious membrane. The remainder of the common and the external iliac veins were coated also with a dark-coloured membrane, and their centre filled with a brownish ochery-coloured tenacious substance, rather more consistent than the crassamentum of the blood.

The left hypogastric or internal iliac vein was in the same condition, but in some places reduced to a cord-like substance, and its cavity throughout completely obliterated. The branches of this vein, taking their origin in the uterus, and usually termed the uterine plexus, were found completely plugged up with firm, red coagula. From the commencement of the branches of this plexus of the hypogastric vein to the termination of this vein in the iliac, the whole had become thickened, contracted, and plugged up with coagula and adventitious membrane of a dark blue colour.

The same changes had taken place in the uterine plexus, and trunk of the right hypogastric vein, from the uterus to its unusual termination in the left common iliac vein. The coats of the left femoral vein were thickened, and closely adherent to the artery and surrounding cellular substance; its whole interior lined with an adventitious membrane, and distended with a reddish-coloured coagulum. The same morbid changes presented themselves in the deep and superficial branches as far as they were examined down the thigh.

A woman, aged forty, who had been delivered of twins a month before, and had nearly perished from flooding, and subsequently from an attack of uterine inflammation, was seized on the 27th August 1829, with a violent fit of cold shivering, followed by pyrexia and pain in the right iliac region and groin. In the course of the two following days, the pain increased in severity, and extended down the inner surface of the thigh towards the ham, and the whole leg and thigh became much swollen. 29th. The whole right inferior extremity affected with a general intumescence, and completely deprived of all power of motion. The temperature of the limb, particularly along the inner surface, much higher than that of the other; but the integuments retain their natural colour, and do not pit on pressure. The femoral vein for several inches under Poupart's ligament, is very distinctly felt enlarged, and is very painful when pressed. Out of the course of the crural vessels little uneasiness is produced by pressure. In the right side of the hypogastrium there is also great tenderness; pulse 120; tongue furred. She appears pale and depressed, and complains of deep-seated acute pain in the lower part of the back when she attempts to move. From this period until the 22d September, when she died, she suffered from repeated fits of shivering, which occasionally assumed a regular intermittent form; there was diarrhœa, with brown tongue; the glands in the right groin became much enlarged, and the left inferior extremity became affected in a manner similar to the right.

Dissection.—The veins presented nearly similar appearances to those observed in the preceding case. The divisions of the vena cava were in this instance both affected. On the left side the cavities of the iliac and femoral veins were filled with a dark purple coagulum, their coats being not much thicker than natural; whilst on the right side the coats of these veins were dense and ligamentous, and the cavities blocked up by adventitious membranes, or lymph of a dull yellow colour. The lower part of the vena cava, for the space of two inches, as well as the right common iliac, was obstructed by a tough membrane of lymph surrounding a soft semi-fluid yellowish matter. The right common, external, and internal iliac veins were imbedded in a mass of suppurating glands, the purulent fluid of which had escaped into the adjacent cellular membrane, and forced its way downwards in the course of the psoas muscle as low as Poupart's ligament. The right hypogastric vein was reduced to a small impervious cord, and its branches were distended with coagula of lymph of a bright red colour. The right femoral and its branches were in like manner impervious, their coats being greatly thickened, and their interior occupied by coagula. The cavities of the left common external iliac and hypogastric veins contained soft coagula, disposed in layers which adhered to the inner tunic of the vessel.

The trunk of the left hypogastric vein was contracted, its coats somewhat thickened, and its branches filled with worm-like coagula. The spermatic veins were healthy. The cellular membrane of both lower extremities was infiltrated with serum.

The *causes* of uterine and crural phlebitis have already been pointed out in the article Fever, Puerperal. Inflammation of veins, it was there observed, rarely takes place in any part of the body where it cannot be referred to a wound or to some specific cause externally applied to the coats of the vessels. In uterine phlebitis the inflammation cannot, it is true, be traced in all cases to the semi-lunar shaped orifices in the lining membrane of the uterus which communicate with the sinuses where the placenta had adhered; yet it scarcely admits of a doubt that the frequent oc-

currence of the disease arises from the orifices of these veins in the lining membrane of the uterus being left open after the separation of the placenta, by which a direct communication is established between the cavities of these veins and the atmospheric air, in a manner somewhat analogous to what takes place in amputation and other extensive wounds.

The veins which return the blood from the uterus and its appendages may be either wholly or in part inflamed; generally, however, the inflammation attacks the spermatic veins alone, and for the most part the one only on that side of the uterus to which the placenta has been attached: and it may confine itself to a small portion of the vessel, or extend throughout its whole course from the uterus to the vena cava. The same is the case with regard to the hypogastric veins, one only being generally affected. These veins are, however, rarely inflamed in comparison with the spermatic; and this would seem to depend on the latter veins being invariably connected with the placenta, to whatever part of the uterus it may happen to be attached.

In eight of the twenty-three cases of puerperal crural phlebitis which have come under the writer's immediate observation, the disease has commenced between the fourth and twelfth days after delivery, and in the remaining fifteen it appeared subsequent to the end of the second week after parturition. In most of the patients there was either an attack of uterine inflammation in the interval between delivery and the commencement of the swelling in the lower extremity, or there were certain symptoms present which are to be regarded as characteristic of venous inflammation, viz. rigors, headach, prostration of strength, a small rapid pulse, occasional paroxysms like those of ague, nausea, loaded tongue, and thirst.

The sense of pain at first experienced in the uterine region, has afterwards been chiefly felt along the brim of the pelvis, in the direction of the iliac veins, and has been succeeded by tension and swelling of the part. After an interval of one or more days, the painful tumefaction of the iliac and inguinal regions has extended along the course of the crural vessels, under Poupart's ligament, to the upper part of the thigh, and has descended from thence in the direction of the great blood-vessels to the ham. Pressure along the course of the iliac and femoral vessels has never failed to aggravate the pain, and in no other part of the limb has pressure produced much uneasiness. There has generally been a sensible fulness perceptible above Poupart's ligament, before any tenderness has been experienced along the course of the femoral vessels; and in every case at the commencement of the attack, we have been able to trace the femoral vein proceeding down the thigh like a hard cord, which rolled under the fingers.

A considerable swelling of the limb, commencing in the thigh and gradually descending to the ham, has generally taken place in the course of two or three days, and in some cases immediately after the pain has been experienced in the groin. In other cases the swelling has been first observed in the ham or calf of the leg, and has spread from these parts upward and downward until the whole extremity has become greatly enlarged. The integuments have then become tense, elastic, hot, and shining, and in most cases where the swelling has taken place rapidly there has been no pitting upon pressure or discolouration of the skin. In several well-marked cases, however, of crural phlebitis, at the invasion of the disease, the impression of the finger has remained in different parts of the limb, more particularly along the tibia; but as the intumescence has increased, the pitting upon pressure has disappeared, until the acute stage of the complaint has passed away. At the onset of the disease we have also observed, in several cases, a diffuse erythematous redness of the integuments along the inner part of the thigh and leg. In one individual only has suppuration of the glands taken place in the vicinity of the femoral vein but in several, by an extension of the inflammation, the inguinal glands have become indurated and enlarged. In some women the inflammation of the femoral vein has appeared to be suddenly arrested at the part where the trunk of the saphena enters it, and the inflammation has extended along the superficial veins to the leg and foot. The swelling and pain in these instances have been greatest along the inner surface of the thigh, in the course of the saphena veins. In most cases of crural phlebitis, not only the whole lower extremity, but the nates and vulva have been affected with a glossy, hot, colourless, and painful swelling, which has not retained the impression of the finger.

The power of moving or extending the leg has been completely lost after the disease has been fully formed, and the greatest degree of freedom from pain has been experienced by the patients in the horizontal posture, with the limb slightly flexed at the knee and hip joints. The severity of the pain and febrile symptoms has usually diminished in a few days after the occurrence of the swelling; but this has not invariably happened, and we have seen some individuals suffer from excruciating pain for many weeks, or through the whole period of the acute stage of the disease.

The duration of the acute local symptoms has been very various in different cases. In the greater number they have subsided in two or three weeks, and sometimes earlier, and the limb has been then left in a powerless and œdematous state. The swelling of the thigh has first disappeared, and the leg and foot have more slowly resumed their natural form. In one case, after the swelling had subsided several months, large clusters of dilated superficial veins were seen proceeding from the foot along the leg and thigh, to the trunk; and numerous veins as large as a finger were observed over the lower part of the abdominal parietes. In some women the extremity does not return to its natural state for many months or years, or even during life. In the summer of 1831, a lady was placed under our care for an affection of the left lower extremity, who, forty years before, had suffered from an attack of crural phlebitis in the same side. The left leg and thigh had remained larger and weaker than the other during the whole of this long period, and was liable to suffer severely from fatigue and slight changes in the atmosphere. This lady was attended in her confinement by a

celebrated London accoucheur, who was so strongly impressed with a belief of the truth of the doctrine of Puzos respecting milky deposits in crural phlebitis, that he ordered the infant to be kept night and day at the breasts, lest the milk should make its way into the thigh.

In four cases of this affection, after the acute symptoms had begun to subside, the same appearances were observed in the iliac and femoral veins of the opposite extremity, and the other thigh, the leg, and the foot became similarly affected. In two individuals only has the disease attacked the same extremity twice. In one woman an interval of twelve years elapsed between the first and second attack.

Dr. Hull has given the following description of the disease. (On Phlegmasia Dolens, p. 133, Manchester, 1800.) "It has in many instances attacked women who were recovering from puerperal fever, and in some cases has supervened, or succeeded to thoracic inflammation. It not uncommonly begins with coldness and rigors. These are succeeded by heat, thirst, and other symptoms of pyrexia; and then pain, stiffness, and other symptoms of topical inflammation supervene. Sometimes the local affection is from the first accompanied with, but is not preceded by febrile symptoms. Upon other occasions the topical affection is neither preceded by puerperal fever nor rigors, &c.; but soon after it has taken place, the pulse becomes more frequent, the heat of the body is increased, and the patient is affected with thirst, headach, &c. The pyrexia is very various in degree in different patients, and sometimes assumes an irregular remittent or intermittent type.

"The complaint generally takes place on one side only at first, and the part where it commences is various; but it most commonly begins in the lumbar, hypogastric, or inguinal region, on one side, or in the hip or top of the thigh, and corresponding labium pudendi. In this case the patient first perceives a sense of pain, weight, and stiffness in some of the above-mentioned parts, which are increased by every attempt to move the pelvis or lower limb. If the part be carefully examined, it generally is found rather fuller or hotter than natural, and tender to the touch, but not discoloured. The pain increases, always becomes very severe, and in some cases is of the most excruciating kind. It extends along the thigh, and when it has subsisted for some time, longer or shorter in different patients, the top of the thigh and the labium pudendi become greatly swelled, and the pain is then sometimes alleviated and accompanied with a greater sense of distension. The pain next extends down to the knee, and is generally the most severe on the inside and back of the thigh, in the direction of the internal cutaneous and crural nerves; when it has continued for some time, the whole of the thigh becomes swelled, and the pain is somewhat relieved; the pain then extends down the leg to the foot, and is commonly most severe in the direction of the posterior tibial nerve; after some time the parts last attacked begin to swell, and the pain abates in violence, but is still very considerable, especially on any attempt to move the limb. The extremity, being now swelled throughout its whole extent, appears perfectly or nearly uniform, and it is not perceptibly lessened by an horizontal position, like an œdematous limb. It is of the natural colour, or even whiter; is hotter than natural; excessively tense and exquisitely tender when touched; when pressed by the finger in different parts, it is found to be elastic, little if any impression remaining, and that only for a very short time."

After describing the manner in which the constitutional and local symptoms subside, Dr. Hull further observes, that "hitherto the disease has been described as affecting only one of the inferior extremities, and as terminating by resolution or the effusion of a fluid that is removed by the absorbents; but unfortunately it sometimes happens that after it abates in one limb, the other is attacked in a similar way. It also happens in some cases that the swelling is not terminated by resolution. For sometimes a suppuration takes place in one or both legs, and ulcers are formed which are difficult to heal. In a few cases a gangrene has supervened. In some instances the patient has been destroyed by the violence of the disease before either suppuration or gangrene has happened."

2. Crural Phlebitis in Women who are not in the puerperal state.—The cases which have been related in the work already referred to, prove that inflammation of the iliac and femoral veins is a disease not peculiar to women who have recently been delivered, but that it may also arise from suppressed menstruation, malignant ulceration of the os and cervix uteri, and other organic diseases of the uterine organs.

In a lady aged thirty-one, whose case has been recorded by Tommasini, the catamenia were suddenly suppressed from immersion of the body in cold water. Headach, fever, and swelling of one of the limbs took place, and in three months she was attacked with great anxiety, prostration of strength and spirits, and other signs of a severe disease. The pulse was frequent and irregular, and there was great anxiety in respiration; the blood drawn was buffy. Phlebitis of the inferior extremity manifested itself. The pulse became intermittent, the veins of the limb painful and turgid, and the skin covered with spots of a dark colour. The sense of oppression increased, and death took place about four months after the commencement of her illness. On dissection, the lungs were found inflamed. In the limb affected, the coats of the saphena, sural, popliteal, crural, and iliac veins were thickened, injected, and filled with coagula of blood which in some parts of the crural veins appeared to be changed into a fleshy substance. The coats of the iliac above the crural arch, to the bifurcation of the vena cava, were much thicker than the other veins, and more injected, without any manifest collection of purulent matter. The arterial system was healthy; the condition of the internal iliac and uterine veins has not been described, although there can be little doubt the effusion originated in the uterus. (*Tommasini*, Saggio di Pratiche Considerazioni fatte nella Clinica Medica di Bologna, p. 317.)

In four cases which have come under our observation, inflammation of the iliac and femoral

veins, giving rise to all the phenomena of phlegmasia dolens, has followed the sudden suppression of the catamenia from exposure to cold.

In the first there was great tenderness of the hypogastrium and left thigh, a rapid feeble pulse, delirium, brown tongue, vomiting, exquisite pain in several of the joints both of the upper and lower extremities, and abscesses formed in different parts of the body.

In the second case, which occurred in a young lady, the whole left inferior extremity was swollen, hot, and painful, but not discoloured. The femoral vein was felt under Poupart's ligament like a large hard cord, and pressure over it and along the course of the iliac veins of the same side produced great suffering. The affection presented the same characters as in puerperal crural phlebitis, and could be distinctly referred to the sudden suppression of the catamenia.

In another case, referable to exposure to cold, the disease occurred in both lower extremities.

In the article Œdema it is observed that in women suffering from amenorrhœa, œdema is one of the most common attendants. In these cases there is considerable tenderness in the course of the femoral veins, the most common site of this tenderness being just before the vein pierces the tendon of the triceps to pass into the ham, and probably depends on some inflammation of the vessel. (See Œdema.)

From cases which we have likewise related, it appears that uterine phlebitis sometimes follows abortion, and that it has taken place and proved fatal after the removal of a polypus of the uterus by ligature. Tenderness in the course of the venous trunks of the lower extremities, and œdema of the limbs, have also in several cases been traced to some external injury inflicted on the uterus.

The first case of crural phlebitis from malignant ulceration of the os uteri, came under our notice nearly four years ago, and for several weeks before death the patient experienced great tenderness in the course of the left femoral vein, with a tense swollen state of the limb. On opening the abdomen, the peritoneum covering the intestines and liver was found to be inflamed, with an effusion of purulent fluid into the abdominal cavity. The os cervix, and a great part of the body of the uterus, had been destroyed by phagedenic ulceration, and extensive openings had formed in the bladder and rectum. On the left side, between the remaining portion of the uterus and the pelvis, to the brim of which it firmly adhered, was a spongy cancerous mass, enclosing within it the branches and trunk of the hypogastric vein and artery, and a considerable portion of the common and external iliac veins. When cut into, it presented a spongy texture, and a thick whitish purulent fluid escaped, as if from numerous cells, but which were subsequently ascertained to be cavities of veins. A portion of the common and external iliac veins was lost in removing the parts from the body. What remained of the common iliac was reduced to a slender tube, which was partially coated on the inner surface with an adventitious membrane of a black colour.

The commencement of the external iliac was also contracted so as to be impervious, and lined with a dark-coloured false membrane. The common superficial and deep femoral veins were all plugged up with firm red coagula, the coats thickened, and the inner surface lined with adherent false membranes.

The cellular texture of the limb was loaded with serum; but in other respects it was healthy, as were the other tissues.

From these and similar cases which have since occurred to the writer, to Mr. Lawrence, (Med. Chir. Transact. vol. xvi. p. 59. 1830,) and to Dr. Blundell, it appears not only that inflammation of the veins of the uterus may be produced by malignant ulceration of the os and cervix uteri, but that this inflammation may extend along the internal to the common external iliac, and femoral veins, and thus give rise to all the phenomena of crural phlebitis, as observed in puerperal women.

[The view that phlegmasia dolens is a crural phlebitis, is now admitted by the generality of pathologists. (Churchill, *The Diseases of Females, including those of Pregnancy and Child-bed*, p 545, Amer. edit., by Dr. Huston, Philad. 1843; Raige Delorme, in *Dict. de Méd.*, xxiv. 250, Paris, 1841; and Hüter, in Encyclopäd. Wörterb. der Medicinisch. Wissenschaft. xxvii. 168, Berlin, 1842.)]

3. Phlegmasia Dolens in Men. — It has recently been ascertained that this disease, in the male sex, may commence either in the hemorrhoidal, vesical, or in some of the other branches of the internal iliac veins, in consequence of inflammation or organic changes of structure in one or more of the pelvic viscera. Crural phlebitis in men arises much more frequently, however, from inflammation being excited in the superficial veins of the leg, extending upward and involving the great venous trunks of the thigh and pelvis. External injuries, exposure to cold and moisture, and ulcers, are the most frequent causes of inflammation of the saphena veins. Amputation may also excite crural phlebitis, both in the veins of the same side and in those of the opposite extremity. Tumours, by pressing upon the vena cava and iliac veins, may also give rise to the disease.

The following observations will illustrate, though in a less perfect manner than might be desirable, this interesting part of the pathology of veins.

Mr. Lawrence examined the body of a man who died at St. Bartholomew's Hospital of cancer of the rectum, and he found the iliac veins inflamed and obstructed. The affection not having extended into the veins below Poupart's ligament, none of the usual symptoms of crural phlebitis manifested themselves.

In two cases of crural phlebitis, related by Mr. Holberton, the patients died of phthisis, with diarrhœa and ulcerations of the bowels. In the first case, the examination was imperfect, but in the second the writer traced the left hemorrhoidal veins close to the spots of ulceration in the mucous membrane of the rectum, and the coats of these vessels were unusually thickened, and exhibited other marks of previous inflammation. (Med. Chir. Transact. vol. xvi. part i. p. 70.)

The patient whose case has been recorded by Dr. Forbes, likewise died of phthisis, and suffered from diarrhœa. The internal iliac vein was not traced to the rectum, but Dr. Forbes has recently stated to us his belief that the mucous membrane

of the lower intestines was ulcerated. (Ibid. vol. viii. p. 293.)

Dr. Cheyne observes in his Report of the Whitworth Hospital, which contains an account of dysentery, that "it is worthy of remark that a swelling occurred in several of the patients, both males and females, resembling the phlegmasia dolens in all respects but in its connection with parturition."

Dr. Tweedie has related cases of fever which were followed by painful swellings of the lower extremities, which also in all essential circumstances resembled phlegmasia dolens; but as these patients recovered, the condition of the veins or the intestines was not ascertained. (Edin. Med. and Surg. Journal, vol. xxx.)

Drs. Graves and Stokes have subsequently related cases of painful swellings of the lower extremities after fever, which presented all the usual symptoms of phlegmasia dolens, and were considered by them to be identically the same diseases. In both, they remark, œdema occurred unattended by redness, but accompanied by increase of heat with great tenderness and pain, and followed for a considerable time by impaired motion of the limb. In both diseases the swelling and the other symptoms are frequently not confined to any one portion of the extremity, but extend uniformly over the leg and thigh. In both diseases, however, we have also often observed that the pain, heat, and swelling occupied particular parts of the limb, while the rest was comparatively free from disease. Thus, in some cases a portion of the thigh was extensively engaged while the leg and foot remained in the natural state, and after some days the diseased action seemed to change its place, and successively attacked the other portions of the limb, without, however, any precise order in the mode of succession. (Dublin Hospital Reports, vol. v. p. 29.)

In the spring of 1833 a case of chronic dysentery came under the observation of Dr. Macann, in which phlegmasia dolens took place a short time before death. On dissection, the common, external iliac, and femoral veins of the left side were found to be completely obstructed, and their coats extensively disorganized by inflammation. The writer is indebted to his friend Dr. Forbes for this valuable specimen of inflamed veins, which was presented to Dr. Forbes by Dr. Macann, previous to his departure for the West Indies. In the short notice of the case it is stated that both lower extremities were swollen. It has not been ascertained whether the condition of the lining membrane of the rectum was examined by Dr. Macann, or if he attempted to trace the hemorrhoidal veins to their commencement.

In Dr. Cheyne's cases of dysentery it is highly probable the disease commenced in the hemorrhoidal veins, and from the frequent occurrence of inflammation and ulceration of the intestines in continued fever, we are disposed to think the affection had the same origin in the cases of Drs. Tweedie, Graves, Stokes, and Macann.

A man, whose case is recorded by Cruveilhier, had a sound introduced into the bladder for retention of urine, occasioned by a swelling of the prostate. Pain was experienced soon after in one of the lower extremities, and the veins became painful and distended like hard cords. The patient died, and all the different degrees of phlebitis were observed in the veins of the limb. There can be little doubt, M. Cruveilhier observes, that inflammation of the prostatic or vesical veins had been induced by the introduction of the instrument in this case, but the examination not having been conducted with a view to ascertain this point, it was not positively determined.

More frequently, both in the male and female sex, the inflammation does not commence within the pelvis, but originates in the superficial veins of the limb, and gradually extends upwards to the large deep venous trunks.

Mr. C. Hutchison has related the history of an interesting case of phlegmasia dolens in a gentleman who received a blow on his right shin, immediately over a branch of the saphena vein, by a small piece of timber accidentally falling upon it. The accident was followed by considerable swelling and inflammation all over the limb; pain was felt in the direction of the upper third of the saphena before it actually dips to unite with the femoral vein. The whole leg and thigh soon became enlarged and inflamed, and many months after the acute symptoms had subsided, when we examined the limb with Mr. Hutchison, Sir Gilbert Blane, and Dr. Gairdiner, there could be no doubt that the saphena and femoral veins had become completely impervious from inflammation. (Med. and Chir. Transactions, vol. xv. 1829.)

Sir A. Cooper performed an operation for varix of the saphena vein, which was followed by inflammation of the coats of the vessel and all the symptoms of phlegmasia dolens.

The following fatal case of crural phlebitis, induced by exposure of the limbs to cold and moisture, has been recorded by Drs. Graves and Stokes. A young man, of a strong habit, was employed for two successive days in working in a ditch, and was consequently obliged to stand in water above his knees during that time. On the following day he became affected with lassitude, vertigo, and general weakness, and complained of severe pain in the right thigh. These symptoms continued for seven days, when he was admitted into the Meath Hospital. His countenance was anxious and depressed, the tongue furred; thirst, headach, urine scanty, turbid, and high-coloured; pulse ninety-six, skin mottled with petechiæ. In addition to these general symptoms, the respiration was laboured and unequal, with some cough; face very livid. But his chief complaint was a severe pain in the upper and anterior part of the right thigh, which was greatly aggravated by motion or pressure. He had also severe pain in the left hypochondrium.

At this time no swelling of the limb whatever could be detected; but in the course of two days the upper portion of the thigh became evidently swollen, the part being extremely tender, but not at all red. The pain of the side continued, and extensive bronchial and pneumonic inflammation was detected. General bleeding and very free leeching to the limb were employed. The blood was not inflammatory, and no relief was experienced by the patient. The swelling of the thigh increased; calomel and opium were freely exhibited, but without any effect. The typhoid symp-

toms increased, and the patient died on the fourth day after his admission.

On dissection, the right lower extremity was found to be tense and swollen in its superior portion, while the leg and foot were slightly anasarcous. The sac of the pericardium contained some sero-purulent fluid; and that portion covering the auricles and great vessels was vascular, and in many cases covered with coagulable lymph. Both lungs were in a state of extreme sanguineous congestion with commencing solidity in their posterior inferior portion, and general inflammation of the pleura. The bronchial mucous membrane was universally red, and the tubes filled with frothy mucus.

The vena cava contained a few portions of a substance of a granular appearance, friable, and of a yellowish colour. This did not adhere to the vessel, which otherwise appeared healthy. In the external iliac vein, however, just above Poupart's ligament, there was a large concretion of a similar nature nearly plugging up the vessel, and extending into some of the minute collateral branches. The lining membrane was red, and in one point adhered to the coagulum. No puriform matter could be detected. The femoral and popliteal arteries were healthy. The cellular tissue of the limb was œdematous. The condition of the saphena vein where it enters the femoral is not described, although the inflammation most probably originated in the superficial vessel.

On the 2d of February 1832, the body of an aged man was brought into the dissecting-room of Webb-street school. The whole left inferior extremity was much swollen, and a chronic ulcer was observed over the tibia. The coats of the saphena vein along the leg and thigh were found, on examination, to be much thickened, and plugged up with coagula of blood and lymph. The left common and external iliac and femoral vein to the ham were all completely obstructed with coagula of blood and lymph, and lined with adventitious membrane. The lower part of the vena cava, to the extent of three inches, was filled with a soft yellowish coagulum of lymph, which adhered to the inner coat of the vein. The coats of the principal arteries of the left lower extremity were ossified.

In April 1832 Sir Henry Halford read an account to the College of Physicians of crural phlebitis as observed in the late Earl of Liverpool. The attack commenced many years before; and it is highly probable, from a circumstance stated to us by Sir A. Cooper, that it was induced by exposure to a current of cold air, which passed through an open window and fell upon the lower extremities when but thinly clothed, his lordship being at a crowded levee. The left groin, thigh, and leg were affected; and in the acute stage of the complaint, leeches and the usual antiphlogistic remedies had been employed by Dr. Pemberton and Sir A. Cooper. Lord Liverpool subsequently died from an affection of the brain; and on examining the body, the left iliac, femoral, and saphena veins were found to have undergone changes of structure similar to those which have previously been described as occurring in puerperal crural phlebitis. Sir Henry Halford related two other cases of crural phlebitis in men. They were similar to the case of the Earl of Liverpool, and were succeeded by marked tendency to head affection. In none of the cases of crural phlebitis which have fallen under our observation, has any remarkable slowness of pulse or tendency to disease of the brain been observed. Even where the vena cava and both iliac and femoral veins have become completely impervious, the blood has been returned to the heart without difficulty, and no affection of the brain has taken place.

In a patient of the British Lying-in Hospital, who had suffered much from varicose veins in the latter months of gestation, inflammation of the saphena veins of both lower extremities came on two days after delivery with most severe constitutional symptoms. From the left knee to the ankle on its inner surface, the integuments were hot, and swollen, and tense, and in several places large patches of a dark red colour were observed over the superficial veins, which being laid open in two places, a considerable quantity of purulent fluid was discharged. Where the swelling and tension were least, the superficial veins could be felt distended like hard cords; as could also the saphena through its whole course upward from the ham to its junction with the femoral vein. In the course of this vein there was considerable swelling; and the integuments in this situation, as far as the middle of the thigh, were hot and of a dark red colour.

The symptoms which characterize venous inflammation in its most severe forms took place, and she sank on the fourteenth day after delivery. Dr. Sims assisted us in inspecting the body, when the following morbid appearances were observed. The left lower extremity was very much enlarged. The cellular and adipose membranes from Poupart's ligament, along the inner surface of the thigh and leg to the ankle, were indurated, vascular, and infiltrated with a red-coloured serous fluid. Several abscesses were observed in the cellular membrane immediately beneath the skin in the calf of the leg, and an extensive collection of pus had formed in the interstices of the gastrocnemii muscles. The branches of the saphena in this situation were converted into solid impervious cords; and the coats of this vein, from the knee to its junction with the femoral, were thickened and contracted, and in the lower part the cavity was nearly obliterated. The saphena vein was lined with an adventitious membrane of considerable thickness, which was easily separated from the inner coat. Its opening into the femoral vein, though reduced in size, was pervious; and the coats of the deep femoral vein, from this point to the ham, were thickened and contracted. The inner membrane was rugous, and of a deep red colour; but no deposit of lymph was observable, and its canal was pervious. The femoral vein above the termination of the saphena, and the whole of the external iliac, were thickened and slightly contracted in their dimensions, and lined with a thin coating of lymph. These vessels were pervious, and the common and internal iliac exhibited no sign of disease. The intestines were inflamed; and on the ascending colon there was a small part in the state of sphacelus. (Medical and Chirurgical Transactions, vol. xv.)

We have related other cases of inflammation of

the saphena veins, of less severity, occurring in puerperal women, where the swelling, heat, and tension were confined to the course of these vessels; and it is now clearly ascertained that the whole limb does not become affected when the iliac and femoral veins have remained pervious. The preceding and other cases likewise prove that the inflammation in crural phlebitis, when violent, is not limited to the coats of the veins, but may extend to the cellular membrane, glands, muscles, and other contiguous tissues.

In July, 1830, the author was indebted to the kindness of Dr. Ashburner for the opportunity of observing the progress of an interesting case of crural phlebitis in a female about the middle period of life, who had not been pregnant for several years. A small ulcer above the left internal malleolus gave rise to inflammation of the saphena and femoral, and probably of the iliac veins, and the whole limb became affected with a hot, shining intumescence.

Sir Charles Bell has informed us that he has observed upwards of twenty cases of painful swellings of the superior extremities in women afflicted with cancer of the mammæ. He has been accustomed to refer these swellings to obstruction of the lymphatics, or to compression of the veins by the induration and enlargement of the glands of the axilla. No opportunity has yet occurred to determine by dissection whether or not the painful swelling of the arms is to be attributed in such cases to inflammation and obstruction of the veins; but this has been rendered probable by the facts already related respecting the effects produced on the iliac veins by malignant ulcerations of the uterus. It is rendered still more probable by the following observation of Laennec: "that it is not uncommon to find the veins in the neighbourhood of a cancerous breast filled with pus, either pure or mixed with blood; sometimes fluid, at other times more or less inspissated, and occasionally of the degree of consistence of an atheromatous tumour." (*Translation*, 2d edit. p. 652.)

Treatment.—Puzos recommended repeated and copious venesection for the treatment of phlegmasia dolens; but in all the cases which we have witnessed, there has been so much feebleness of pulse and prostration of strength that we have not ventured to draw blood from the arm. There are cases, however, occasionally met with where the symptoms are immediately relieved by a general bleeding. An example of severe crural phlebitis after delivery recently occurred in the practice of Dr. Duffin, where the abstraction of twenty ounces of blood seemed at once to break the force of the attack. In a great proportion of cases venesection is not required, and we are to trust for the relief of the inflammation to the repeated application of leeches above and below Poupart's ligament, in the course of the crural veins. From two to three dozen of leeches should be applied immediately after the commencement of the disease, and the bleeding should be encouraged by warm fomentations, or by a bread and water poultice to the part. Should the relief of the local pain not be complete, it is requisite soon to reapply the leeches in numbers proportioned to the severity of the attack, and to repeat them a third or even fourth time, at no very distant intervals, should the disease not yield.

Some patients experience greatest relief from the use of warm cataplasms to the limb; others derive most advantage from the application of cold, or of a tepid, evaporating lotion.

The bowels are often much disordered in this disease; but the employment of strong acrid cathartics is always injurious. Repeated small doses of calomel and antimonial powder should be given with some mild purgative, not only with the view of correcting the disordered state of the bowels, but to subdue the local inflammation, and the great constitutional disturbance usually present. It is of importance, also, to administer saline and diaphoretic medicines, and to procure rest and relief from pain by anodynes, until the acute symptoms pass away: the diet should be the same as that usually allowed to patients who are labouring under inflammatory and febrile diseases. We have seen no advantage derived from the use of digitalis in any stage either of uterine or crural phlebitis. Dr. Sims has informed us that the painful swelling and tension of the limb, in a case of phlegmasia dolens, were strikingly relieved by puncturing the skin in different parts with a fine needle.

When the acute inflammatory symptoms have passed away, the limb remains in a weak, œdematous state, and great uneasiness is often experienced from congestion of blood in the veins. Until the collateral branches, which are to carry back the blood to the heart, become enlarged, it is impossible by any means we possess to afford complete relief. Much benefit may, however, be derived in this stage of the complaint from the occasional application of a few leeches to different parts of the limb, and by preserving it in the horizontal position. We have seen mischief produced by having recourse too early to remedies intended to promote the absorption of the fluid effused into the cellular membrane. Blisters, frictions, stimulant embrocations, and bandages to the limb, are only useful when the inflammation of the veins has wholly subsided, and other vessels have become so much enlarged as to carry on the circulation of the blood in the extremity without interruption.

We have not perceived any sensible benefit accrue from the use of mercurial ointment and iodine in crural phlebitis, and we consider the local abstraction of blood at the commencement of the attack to constitute by far the most important part of the treatment.

ROBERT LEE.

PHRENITIS. See BRAIN, INFLAMMATION OF THE.

PHTHISIS PULMONALIS. See TUBERCULAR PHTHISIS.

PITYRIASIS, from *πίτυρον*, *bran*, denotes a cutaneous affection in which irregular patches of the cuticle, varying much in size, appear covered with thin branny or minute powdery scales, which fall off and are soon succeeded by others. This disease is not contagious, and is seldom productive of inconvenience to the patient; it never terminates in crusts or excoriations, but, if neglected, it may alter its character and degenerate into porrigo. During health, the cuticle over the

whole body is constantly undergoing changes, peeling off in minute fragments, while a new and sound surface is formed below. Of this we have sufficient proof in the scales which are daily detached from the scalp by the hair-brush, and those which are always seen on drawing a black silk stocking off the leg. Now when this process of exfoliation is greatly increased on particular spots and patches of the skin, it constitutes the most simple form of pityriasis. There are several varieties of this affection.

1. *Pityriasis capitis.* (Dandriff of the head. Dartre furfuracée volante, *Alibert.*) This eruption is seen on the scalp and eyebrows of infants and sometimes of old men; on the temples and forehead it has a white mealy appearance; but on the occiput it consists of distinct flat scales, semi-transparent and of a light brownish colour. In children it is occasionally connected with imperfect nutrition, but most frequently originates from a mere want of cleanliness. In adults and the aged, dandriff of the head accompanies the falling off of the hair, which so often takes place during convalescence and under chronic disease. This form of eruption sometimes occurs also on the chin and other parts of the face, when they exhibit patches of a rough and mealy appearance; it is occasionally the result of indigestion, but more frequently of some local irritation, as acrid soap or a rough-edged razor.

Treatment. — This eruption, when on the scalp, in general yields readily to removal of the hair, washing of the affected parts with soap and water morning and evening, and anointing them afterwards with some mild cerate. All causes of local irritation must be removed, the general health attended to, and a plentiful supply of wholesome nourishment afforded, should that appear to have been deficient.

The other forms of pityriasis are more remarkable for the discoloration of the skin which attends them than for the mealy or branny desquamation of the cuticle; and hence, although Willan, Bateman, and other English writers, have considered them as species of pityriasis, Alibert, (Maladies de la Peau,) Rayer, (Maladies de la Peau,) and Biet, (Abrégé Pratique des Maladies de la Peau,) arrange them among the *ephelides*, or *tan-spots*. We prefer adhering to the arrangement of our countrymen, because we have always observed some exfoliation of the cuticle in these forms of pityriasis, at least during the height of their course; and because they differ from true ephelis in appearing especially on those parts of the body which are not exposed to the sun's rays. Three varieties have been distinguished by the names of *versicolor*, *rubra*, and *nigra*.

2. *Pityriasis versicolor.* (Chequered dandriff. Ephelides hepatiques; chloasma pseudo-porrigo; maculæ hepaticæ; leberflechte.) This is characterized by yellowish or light brown spots, and sometimes large patches of the most irregular outline, branching into the healthy coloured surface, or enclosing portions of it; not in the least elevated, and usually covered thinly by fine powdery scales. The colour varies in intensity according to the greater or less vascular turgescence of the skin, and when this is much excited, verges into the reddish tint of the succeeding variety. The most frequent seats of this eruption are the front of the chest and upper part of the belly; it appears also on the neck and back, and sometimes on the shoulders and arms. It is seldom productive of any discomfort, except under particular circumstances of excitement, when it is accompanied by itchiness of the skin on the patient becoming warm in bed; and should the stomach be disordered, this occasionally proves very troublesome. But the great source of uneasiness is more commonly in the mind, from the fears of the patient, who sees in this affection what he imagines to be the copper-coloured blotches of a confirmed venereal infection. Many times have we been consulted by persons affected with the light brown and red varieties of pityriasis under this impression, and not a few of them had been subjected to prolonged courses of mercury and sarsaparilla,—we need not add without benefit. The difference between pityriasis and syphilitic eruptions is abundantly well marked, the latter being of a darker and more coppery hue, distinctly elevated above the surface, and leading ultimately to the formation of crusts and ulcerations—appearances which are not observed in any form of pityriasis.

A diversity of opinion exists respecting the anatomical seat of pityriasis versicolor; Dr. Willan (On Cutaneous Diseases, vol. i. p. 194,) states that the rete mucosum or cutis is always affected in this disease, the brown stain being still perceptible after the cuticle has been removed; while Dr. Bateman, (Synopsis, p. 47,) on the other hand, asserts that in some cases he has seen the discoloured cuticle peel off at intervals in a thickened state, leaving a new cuticle underneath of a red hue. But to this latter statement it may be fairly replied, that when the cuticle becomes thickened and thus peels off, the disease has lost the genuine character of pityriasis versiclor. With a view to decide the question, we applied a blister to a portion of skin affected with this disease. After the cuticle was wholly removed, the mottling still remained; but the patches, instead of being tawny, were now changed to a deeper red than the rest of the excoriated surface; thus proving to our satisfaction that the anatomical seat of pityriasis versicolor lies beneath the cuticle.

It is rarely in our power to trace the occurrence of this cutaneous affection to any satisfactory cause, we have sometimes seen it connected with a feeble digestion and indifferent health; but on other occasions nothing of this kind could be observed. An opinion held by some, that it is dependent on disease of the liver, probably originating in the name *maculæ hepaticæ*, is certainly quite groundless. Bateman has observed this eruption in a severe form to follow the free use of spirits while fasting, and exposed in an open boat; and Dr. Willan speaks of various sources of irritation of the stomach and skin as possible causes of this disease, such as acid fruits, mushrooms, sudden alterations of temperature, violent exercise with flannel next the skin; but the whole of these are more likely to give rise to urticaria than to pityriasis.

Treatment.—It must be acknowledged that we have not much power over this disease by in-

ternal remedies; and after the patient has been satisfied as to its innocence and the absence of of all syphilitic taint, he often ceases to think of it, and allows time, if it will, to work a cure. Should the disease seem to have originated from any irritation either of the cutaneous surface or of the alimentary cavities, its cause must, if possible, be removed without delay: when the digestion is impaired, light tonics are to be used, as infusion of calumba with sulphuric acid, or small doses of sulphate of quinia; the bowels are to be regulated, and a milk and nourishing diet enjoined, with abstinence from spirituous liquors, and a very guarded use of wine and ale, if any be allowed. When itching exists, a spirit lotion with borax or alum, or acetate of lead or zinc, will be found useful; or, what rarely fails to give relief, a lotion with hydrocyanic acid. The vapour bath at a moderate temperature will serve to equalize the cutaneous circulation, and soften the branny spots. In our hands nothing has proved so effectual in restoring the natural colour and functions of the parts as a lotion of chloride of lime or soda, varying in strength according to circumstances. The success which has attended this application has exceeded our expectations; but whether its effects are to be regarded as the result merely of a stimulus, or of its bleaching property, admits of question.

[Iodide of sulphur makes an excellent ointment in this as in various other chronic diseases.]

3. *Pityriasis rubra* (red dandriff.) This differs from the preceding species chiefly in the redness of its colour, and the greater excitement of the surface which attends it. It is more uniformly accompanied by heat, itching, and general languor and restlessness, and may be considered as remotely allied to psoriasis diffusa, although altogether free from elevation above the surface, and vastly more mild in all its symptoms. On its decline, it leaves sallow faded stains marking the parts which were affected. The anatomical seat of pityriasis rubra is certainly deeper than the cuticle; its red colour evidently depending on the injected state of the vascular tissue lying beneath.

Treatment.—We have never in any case of red dandriff found the irritation such as to require the abstraction of blood; but in every instance the bowels should be opened by mild purgatives, and those which correct acidity. A soothing or slightly astringent lotion, such as those already described, ought to be applied to the affected parts, and any cause of cutaneous irritation immediately removed.

Dr. Bateman has recommended a diaphoretic plan of treatment,—antimonials, with decoction of the woods, and the warm sea-water bath; and he adds that he has found benefit from small doses of the *tinct. veratri.*

4. *Pityriasis nigra* (black dandriff; éphelide scorbutique). This is an exceedingly rare disease; so much so that Dr. Willan had not seen it at the time of his publication, and Dr. Bateman does not appear to have ever met with it. Alibert has described it under the name quoted above, and figured it as it affects the hands (plate 27 bis.) The cases seen by Dr. Willan occurred in children born in India, and brought to this country. The disease commenced in a partially papulated state of skin, and terminated in a black discoloration, with slight furfuraceous exfoliations: it sometimes affected half a limb, sometimes the fingers and toes. (*Bateman*, Synopsis, p. 49.) In allusion to the foreign origin of this species of pityriasis, we may mention a curious dusky mottling of the skin, which is seen in the children of mulatto women by European fathers, when they approach, as they sometimes do, to the fair complexion of the European. It seems as if patches of the dark hue of the mother shone through the pure skin of the father; and it is chiefly perceptible when they are heated with exercise, or the skin otherwise increased in vascularity.

Some years ago, we had the good fortune to see a case of pityriasis nigra. The patient was an unmarried female, aged forty-five, a native of Scotland, her parents Scotch; and she had never travelled to any distance beyond the precincts of her native city. The skin of her arms, legs, bosom, and neck, but especially the last, was of a dark tint like that of a mulatto, but varying in different parts in depth of hue; and scattered over the dusky surface were many white spots, from which crusts appeared to have separated; and on other parts some crusts appeared still adhering. Both the white spots and the mulatto-coloured surface were slightly scaly. With this disease was combined an eruption of scabies affecting severely the hands, from the itching of which she suffered great annoyance. The disease had existed for some months; and at the time when it commenced she was reduced to a state of great misery and destitution. By the employment of sulphur frictions, the warm bath, and a plentiful supply of nourishing food, the natural colour of the skin was nearly restored after the lapse of some weeks; but we are ignorant whether a complete cure was in the end effected. This case confirms the remark of Dr. Bateman, that the disease is the result of misery and filth, but not his opinion that both the disease and its cause are wholly unknown in this country. (Synopsis, p. 49, note.)

Treatment.—Our first object in pityriasis nigra is to clear out the bowels by mild purgatives, and thoroughly purify the surface of the body with soap and water. A course of tonic aperients, with the regular use of the warm water or vapour bath, should then be prescribed, while the patient is put upon a moderate allowance of nourishing food. As his appetite and strength improve, the quantity of food is to be increased, and the warm bath exchanged for sulphur fumigations; or if the disease prove obstinate, recourse ought to be had to the cautious employment of the arsenical liquor, and the external use of the chloride of lime or soda, as in pityriasis versicolor.

W. Cumin.

PLAGUE, from πληγὴ, Gr. *plaga*, Lat. a *blow* or *wound;* th. πήσσω, *to strike.*—This is the name of a well-known and extremely fatal disease, which is endemic in Egypt and certain other countries bordering on the Levant, and has made frequent and destructive irruptions into Europe. The malady thus designated is called *pestis* and *pestilentia* by the Latin writers, λοιμὸς by the Greeks, *la peste* by the French, *pestilenza* by the Italians, and *pest* by the Germans, which last name is not unfrequently bestowed upon it by

ourselves. It is a curious fact that these words have each in their respective languages a signification distinct from the primary one, and expressive of various kinds of moral and physical evil, the malignancy of the disease in all situations being thus evinced by its suggesting the same analogy to people differing widely in physical constitution and mental habitudes.

The words plague, pest, and pestilential, and their corresponding terms in different tongues, have frequently, even when applied to diseases, a sense considerably vague. The disease we are about to treat of has always been comprised in these terms, but other maladies have been similarly designated, with which, probably, it had no quality in common excepting that of being extremely diffusible and fatal; and hence by *morbi pestilentiales* we are not always to understand a form of plague in a strict sense of the word. This want of precision of language is very conspicuous in Hippocrates and his commentator Galen, (Galeni Commentar. in lib. i. Epidemic. in lib. iii. cap. xx.; et in Aphor. lib. iv. &c.) whose idea of a pestilential disease appears to have corresponded very nearly with that which we express by the term epidemic; and a similar want of accuracy is perceptible in the writings of the Arabians, from whom we might for obvious reasons have expected the greatest precision.

The subject was so much obscured by the vague application of terms, that even at so late a period as 1775 the Faculty of Medicine of Paris proposed the following queries as the subject of a prize essay: "*If plague be a distinct disease*, what is its character? and what are the means of treating and preventing it?"—queries which were thought to have been successfully solved by M. Pâris of Arles. We need scarcely observe, what is now universally admitted, that the characters of plague are as distinctive as those of small-pox, measles, scarlatina, or any other disorder.

This disease is endemic in Egypt, and very often exists in adjacent territories; but the former country is unquestionably the great source whence it extends its ravages into surrounding districts; and a very learned and ingenious writer is of opinion that there only is it ever engendered, and that in other regions it is always an alien. (*Foderé*, Dictionnaire des Sciences Médicales, v. 41. p. 87.) In Egypt it is said to arise every autumn, and to prevail till the beginning of June of the succeeding year: its ravages then cease, and its contagion is extinguished or remains in abeyance during summer, to be again called into existence or activity in the autumn. The vernal equinox is the period of the greatest fatality of the disease. About this time, we learn, southerly winds blow with great violence. They last ordinarily three or four hours, and are frequently renewed daily for fifty successive days. They are very warm, passing over the burning deserts which border Egypt on the south, and they are, moreover, loaded with putrid emanations exhaled from the animal and vegetable substances which are decomposed in the lakes formed by the retiring of the waters of the Nile, or in the cemeteries which its inundation has reached. At this sickly season, diseases of all kinds assume a malignant character: it was at this season, that after the great inundation of 1801, the plague committed the greatest ravages among the inhabitants of Cairo, and Upper Egypt. In June the wind blows from the north, and being cooled in traversing the Mediterranean, renders that season the most refreshing and salubrious of the year, during which no sickness manifests itself. (*Baron Larrey*, Description d'Egypte, ou Recueil d'Observations et de Recherches, &c. publié par ordre du Gouvernement, Paris, 1821.)

It was to be expected that a disease eminently contagious should be occasionally diffused through countries having incessant intercourse with the land of its origin; and we find it repeatedly visiting the people, paying allegiance more or less direct to the Ottoman Porte, and not unfrequently ravaging Constantinople. Formerly it penetrated into more northern climes. Previously to the year 1665 it usually invaded England, as Sydenham informs us, at intervals of from thirty to forty years; but since the cessation of the celebrated epidemic of that year, which destroyed eight thousand inhabitants of London in the course of one week, though two-thirds of the population had previously fled from the city, it has not been seen in Britain. In other European countries it has much more recently manifested itself. Marseilles, which had previously suffered twenty severe visitations in the course of seventeen centuries, was ravaged by it in 1720; Moscow suffered a severe infliction in 1771 and 1772; and within the present century it prevailed at Noja in the Neapolitan dominions, in 1815 and 1816; it appeared in the Lazaretto of Venice in 1818, and at Gressemberg in Silesia in 1819. But with these exceptions it has been for a century generally confined to Africa, the land of its origin, and to those portions of Asia and Europe which own the Ottoman sway.

[A concise history of the disease is given by Vetter, in Art. *Pestis*, in Encyclop. Wörterb. der Medicinisch. Wissensch. xxvi. p. 625: Berlin, 1841.]

Symptoms. — The following definition will suffice to convey a general idea of plague, although, as is usually the case with nosological definitions, it does not comprise certain cases sometimes observed, which form exceptions to the ordinary character of plague:—an exanthematous disease, the eruption consisting of buboes, carbuncles, and pustules, white, livid, or black, distributed in various parts of the body, and generally attended with malignant and very fatal fever.

Various divisions have been proposed by systematic writers; but there is every reason to think that there is no difference existing between cases of the disease which can be regarded as specific, all the varieties being found intermingled in the same epidemic. Plague possesses two prominent characteristics—fever and eruption, both of which are found in fully formed cases; but examples of the existence of one of these symptoms without the other are not of unfrequent occurrence. The cases in which the eruption is wanting constitute the most rapidly fatal type of the disease; whilst, on the other hand, bubo occurring without constitutional disturbance is the slightest form in which this disorder, usually so fatal, can exist. Between these extremes there are various shades of intensity discernible, which, as well as the most

severe and the mildest type, we shall endeavour to depict.

The following sketch of the most rapid and intense form will remind the reader of malignant typhus, and of cases of the ordinary exanthemata, in which the system is so entirely overwhelmed that the eruption fails to appear, or displays itself but faintly. The patients are sometimes attacked suddenly with a loss of strength, a sense of confusion or weight in the head, occasional giddiness, oppression about the præcordia, and extreme dejection of spirits. They are inclined to be silent, and show great anxiety in their aspect, but make little or no complaint, and, either having no febrile symptoms or such as are very obscure, are considered by the persons about them as indisposed in a slight degree. Death takes place in such cases sometimes within twenty-four hours, or occasionally on the second or third day.—Neither buboes nor carbuncles appear, and it is rare to find suspicious marks of infection on the dead bodies. (*Russell*, History of the Plague at Aleppo in 1760, 1761, and 1762, p. 96.)

Others, who are at first attacked in the same manner as the foregoing, become in a few hours more manifestly disordered. Their eyes become muddy, the surface of the body cold; they grow drowsy and lethargic, and complain of pain at the heart. As the distemper advances, they often lose the power of speech; the skin seldom recovers its warmth, or, if it does, there is a mere irregular flushing, which soon gives place to cold and clammy sweats. The pulse sometimes remains nearly in its natural state, but is generally low and quick. Patients are by turns delirious, confused, and sensible, but the comatose disposition is the most prevalent. Towards the close there is incessant inquietude. Buboes rarely appear, and in those only who survive the third day; petechiæ, vibices, or broad, livid, roundish spots occur sometimes, but are not common, and the two latter are seldom visible till after death. All the cases of this description which fell under Dr. Russell's observation were fatal, the patients generally dying on the second or third day, a very few living till the fifth. (Ibid. p. 97.)

This intense form of the disease is most frequently observed at the commencement of an epidemic of plague, when it generally possesses the greatest malignancy. At a later period the following more mild but still dangerous variety is that which is most commonly met with.

The disease commences with coldness sometimes amounting to shivering, which is speedily followed by fever, accompanied occasionally with vomiting, and uniformly with giddiness and pain of the head; but rarely at first with delirium, and scarcely ever with a comatose disposition. The fever increases during the latter part of the day and the following night, but there is a perceptible remission, though by no means a cessation, of fever the following morning. In this form of disease, buboes and carbuncles generally make their appearance the first day, and it is not unusual to see successive eruptions of them appear throughout the disorder.

As the second day advances, there is again an exacerbation of fever; some of the sick are harassed by vomiting; there is distressing headach; the tumours are painful; there is confusion of thought, occasionally a slight disposition to coma; and the muddy eye, so characteristic of the disease,—in which Dr. Russell says muddiness and lustre are so strangely blended together—manifests itself. The skin is hot, the pulse frequent, the tongue dry; the patient is anxious, restless, and complains of pain or oppression about the heart. As night approaches, the feverish symptoms are aggravated; the heat is more intense; the pulse less full, but very quick; the jactitation is great, the eye very muddy, and the patient is disposed to incoherent raving or to stupor. Sweat breaking out early in the morning of the third day always brings a mitigation of the symptoms, and sometimes proves completely critical, but more commonly produces only a remission so favourable as to encourage the expectation of a more perfect crisis on the fifth. But where the patient neither sweats nor experiences a sensible remission on the third day, as is sometimes found to occur without perspiration, danger is always to be apprehended. During these remissions, it should be observed, the pulse becomes slower, softer, and more full, especially after perspiration; and though the eyes still remain muddy, the anxiety and disquietude abate, the intellectual faculties are clearer, and the patient finds himself in every way better.

There are again exacerbations on the third and on the fourth day. A remission takes place on the morning of the latter of these days, preceded by perspirations, but rarely so profuse as that which takes place on the third. The exacerbation of the fourth day is more severe, especially towards night, than that of the second and third, and continues intense till perspiration appearing on the morning of the fifth, and increasing to a profuse sweat of various duration, leaves the patient faint and languid, but in every other respect manifestly relieved. After this day the subsequent exacerbations become slighter and slighter, and the buboes generally advancing favourably to suppuration, little or no fever remains after the beginning of the second week, excepting symptomatic heats occasioned by the eruptions. But where the sweat on the fifth day proves imperfectly critical, milder exacerbations, which usually decline with gentle perspirations, continue to recur till the seventh day, when a second profuse sweat places the patient beyond all danger.

The formidable symptoms which generally occur on the second day in this form of the disease, sometimes do not take place till the third or fourth, and hence it sometimes happens that those who for some days seem to be slightly affected suffer a tedious illness or die contrary to expectation, while more alarming attacks terminate favourably. In the latter case the event remains doubtful till the fifth day; in the former till the end of the week. At these periods a conjecture as to the result may be made with tolerable success; though cases sometimes occur in which matters remain in suspense some days longer.

A much more severe and fatal form of plague, constituting the second class of Dr. Russell, begins generally with slight shivering or sense of cold, which is soon succeeded by fever, accompanied with giddiness, headach, vomiting, and sometimes purging. The fever increasing towards

night, the face becomes flushed, the eyes glisten, and the patient either becomes delirious, or drowsy and comatose. The pulse in this stage usually continues full and strong, and though the tongue is not dry, the thirst is excessive; but the stomach retains little of the liquid taken, and the patient, harassed by the vomiting and other symptoms, passes a very unquiet night. There is an abatement of the symptoms on the succeeding morning; but the pulse is frequent and more or less full, the skin is hot and dry, and the patient dejected. As the day advances, there is an exacerbation, the accession of which is accelerated by vomiting and especially by diarrhœa, which frequently supervenes at this time. The symptoms during this exacerbation are muddy eyes and a peculiar confused expression of countenance, quick pulse, sometimes low and fluttering, but rarely intermitting; a whitish, but rarely a parched tongue; the external heat moderately feverish, or occasionally intense in irregular flushings; pain at the heart or oppression about the præcordia; burning pain at the pit of the stomach and incessant inquietude. The more or less rapid progress of these symptoms denotes more or less danger; but when to these are joined a faltering in the tongue or loss of speech, while the surface of the body, losing its natural or feverish heat, becomes cold and damp with clammy sweats, death is inevitable, though perhaps the fatal moment may still be at some distance. In certain cases, especially where vomiting has been severe, and where diarrhœa or hemorrhage adds to the debility, the third day proves fatal; but the disease is more commonly protracted two or three days longer, advancing so far regularly to its termination, that each subsequent night proves worse than the preceding, and in the day the remissions are so transient and obscure as to leave no room for hope.

Few of the sick recover from this form of plague, whether the disease be left to itself or treated methodically; neither does the result appear to be materially influenced by the course of the buboes. They generally appear on the second day, sometimes on the third, and occasionally later. Suppuration does not take place, and the tumours, advancing or not towards this state, have no visible effect in hastening or retarding the termination of the disease. Carbuncles, as well as petechiæ and vibices, are occasionally met with. (*Russell*, p. 101.)

In the cases of which the eruption constitutes the principal feature, either buboes or carbuncles form, and frequently both occur in the same subjects. The patients are so little indisposed as to be able to walk about the streets or labour at their accustomed avocations, unless prevented by the inflammation of inguinal buboes. Even in more intense forms of the disease, the prostration of strength is in some cases slight; for in the expedition into Syria of the French army of Egypt, several soldiers affected with plague were able to march during a considerable length of time, (*Foderé*, Dictionnaire des Sciences Médicales, vol. xli. p. 77,) and Diemerbroeck relates many examples of which he was an eye-witness, of infected persons walking within a few hours of their death. (De Peste, obs. xxxvi. et liv.)

The pestilential bubo is a swelling of the glands of the groins, the axillæ, the neck, or of the parotid itself; though tumours in this last situation are sometimes named distinctively parotids. Buboes are at first small and deeply seated; they are more or less painful, but never entirely indolent, and they advance towards the surface, and in some cases to suppuration, with various degrees of rapidity. They terminate either in resolution, suppuration, or gangrene; but this last termination is rare, though examples of it are recorded by authors, (*Diemerbroeck*, part i. p. 431); and it is remarked that it rarely takes place in the cellular tissue, but merely in the gland itself, and hence that it can be ascertained only by dissection. (*Russell*, p. 115.) It is considered in all cases a fatal termination. There is a general opinion that the suppuration of buboes, if not essential to the safety of the patient, is in the highest degree conducive to his recovery; but it having been repeatedly observed that buboes never begin to inflame externally, or to show signs of approaching suppuration till the fever is manifestly on the decline, and restoration to health having taken place in innumerable instances though buboes did not undergo this process, there is every reason to think that too much importance has been attached to it, and that it is at most rather a sign than a cause of recovery. Buboes are rarely solitary, two, three, or four existing in the same subject; and this circumstance, their complication with carbuncle and other forms of eruption, and the antecedent and concomitant symptoms which generally exist, will secure us from confounding them with syphilitic swellings. It should be remarked, moreover, that pestilential bubo in the groin generally affects the glands in the vicinity of the crural vessels, though it sometimes appears in the situation of the ordinary venereal tumour.

Besides buboes situated in glandular parts, tumours to which the same name has been given are found in various situations, as on the head, the nape of the neck, the shoulders, the thorax, the vicinity of the umbilicus; in short, they may appear in almost any part of the body or limbs.* During six or eight days they are small hard bodies which do not involve the superjacent skin; but subsequently to this period they become protuberant, and the integument is inflamed. They sometimes disperse, but more frequently suppurate, though more slowly than the glandular bubo. They are numerous, from five to nine generally existing in one subject. Dr. Russell calls them spurious buboes.

Carbuncles may form in any part of the body, and they are not unfrequently observed in the integuments covering buboes. Various forms of them are described, but it is probable that varieties have been multiplied by observers depicting the same species in different stages of its progress. They commence generally in a pustular form, but occasionally like a vesication of the size of a horse-bean, filled with a dusky-yellow or blackish fluid. In the more advanced stage they are hard and very painful, speedily becoming gangrenous, and forming eschars, which tend to spread and

* *Russell*, p. 118. *Zacutus Lusitanus*, apud Diemerbroeck, p. 66. Goodwin's Historical Account, p. 49, and *Baron Larrey*, in the Dictionnaire des Sciences Médicales, tom. xli. p. 77.

rapidly destroy the skin, and sometimes muscular and tendinous parts. They occasionally exist in considerable numbers on the same patient. When recovery is approaching, suppuration takes place round the edges of the eschar, which, separating, leaves an ulcer of greater or less depth, discharging abundantly for some time and then gradually healing; but in fatal cases the eschar remains dry, with little appearance of being cast off.

There are other cutaneous affections observed in plague: of this kind are petechiæ, at first of a pale or purplish red, and subsequently livid; a certain marbled appearance of the skin, evanescent till towards the close of the disease, the variegating colours being of a pale faint blue or darkish red, and an erysipelatous efflorescence remaining visible for a short time. Narrow streaks of a reddish purple or livid colour are sometimes observed; and when they affect the face, they give a frightful appearance to the countenance, producing such an alteration of features, and so disguising the patient, that he can scarcely be recognised by his acquaintances. Vibices, or weals, and large blue or purple spots, the maculæ nigræ of authors, occur in the more depending parts of the body sometimes shortly before death, but they are more frequently not discoverable till after this event, and in both cases probably result from the infiltration into the subcutaneous cellular membrane of the blood attenuated by the disease.

Morbid Anatomy.—In a disease considered highly contagious, a deficiency of information on this head is to be expected, and we find that writers on plague are more copious on any branch of the subject than this. Some authors have, however, endeavoured to illustrate the nature of the disease by dissection, but it must be acknowledged without much success. Deidier made many dissections of persons dead of plague at Marscilles in 1720; but the only material result of his labours was the discovery that the gall-bladder was extremely loaded with black or greenish bile. (Dissertation sur la Contagion de la Peste, Montpellier, 1725.) Another observer of the same epidemic informs us that in some bodies every thing was found in a natural state, and in others that nothing was discovered but slight traces of inflammation of the intestines, which, the writer remarks, were certainly produced in the last moments of the disease. (Relation Historique de la Peste de Marscille, p. 447, 448.) Savaresi, in his Topography of Damietta, relates that in three cases the only morbid appearances were the lining of the intestinal canal and the stomach being covered with a yellowish mucus, and a general hardness of the conglobate glands. (Histoire Médicale de l'Armé d'Orient, p. 89.) Certain individuals have expected to derive information regarding the nature of the disease from the condition of the blood; but the humoral pathology does not appear to have furnished results more satisfactory and uniform than the inspection of the solids; the blood having been found in various states, namely, of a natural consistence and appearance, unduly liquid, and inflammatory or sizy. (Relation Historique, p. 447.) In conclusion, we are compelled to acknowledge that plague is one of the numerous diseases in which the changes during life leave no determinate trace after death to explain their nature or the cause of their fatal issue.

[Of late years, extensive opportunities have existed for noting the morbid appearances in plague. As the disease generally occurs in Mahomedan countries, and as a strong objection exists in them to *post-mortem* examinations, difficulties were at one time thrown in the way of the pathologist: and besides, as already remarked, the ideas in regard to the contagious nature of the disease, have prevented physicians from availing themselves as extensively as they might have done, of the numerous cases that presented themselves to their notice. In recent periods, the abhorrence entertained for dissections has diminished; and the notions of the contagious nature of plague have not been credited by many physicians; hence, necroscopie examinations have been by no means unfrequent; so that we have now numerous records of personal observation, not only of European physicians, but by a Mahomedan, and native of Egypt,—Clot Bey. (Bulard, *De la Peste Orientale*, &c. Paris, 1839. Clot-Bey, *De la Peste Observé en Egypte*, Paris, 1840; and E. Littre, Art. *Peste*, in *Dict. de Méd.* xxiv. 44: Paris, 1841.]

Nature of Plague.—This dreadful disease, like others of the febrile class to which it belongs, evidently results from the introduction into the system of a morbific poison; but much obscurity prevails with respect to the part of the frame which it first affects, and many of the pathological changes which it ultimately produces. The external inflammations and the fever are the only parts of the disease of which we have distinct knowledge. It has already been stated that examples occasionally occur of the absence of one or the other of these phenomena, the imperfection of medical definitions being exemplified by plague as by many other diseases. This imperfection, resulting from the variable phenomena with which the physician is conversant, so markedly contrasted with the uniformity presented by nature to the philosopher, or which in his experiments he can form for himself, does not invalidate the substantial accuracy of the definition, which comprehends an immense majority of cases, and excludes only what may be justly considered as the exceptions to the rule. Many persons have been disposed to look beyond the manifest symptoms of the disease to the interior changes of which these are only the signs or the effects; but it is to be feared that there has been more of speculation than of cautious induction from facts in the opinions these individuals have published to the world; or at least they have made a portion only, and this the smaller portion of cases of plague, the representatives of the whole class. M. Broussais informs us that the causes, the symptoms, and the changes observed in the bodies of those who die of plague, show that the digestive canal is the seat of *the inflammation which constitutes the disease*. If petechiæ, carbuncles, and inflammations improperly called buboes, appear, these symptoms are only according to him, as in typhus, the effects of the sympathetic irritation of the skin and cellular membrane, of which irritation the heat of the climate favours the development.

(Expos. de la Doctrine de M. Broussais dans le Journal Complément. du Dictionnaire, tom. ii. p. 148, 149, et seq.) According to this view, the eruption hitherto deemed characteristic of plague is a mere contingency, and the inflammation of the digestive canal is exalted from an occasional occurrence into the constituent of the disease. It has apparently escaped the writer's observation that the eruption which he attributes to the influence of heat has accompanied the disease in every climate in which it has manifested itself,—in our own in winter, for example, (Sydenhami Opera, p. 108. *De Foe*, History of the Plague, p. 266); and that the affection of the intestines is indicated only in a small proportion of cases, either by symptoms during life, or by the pathological condition of parts after death. The analogy between the petechiæ, which only occasionally appear in typhus, and the characteristic eruption of plague, is too remote to identify these diseases, though we would willingly admit that they are in some degree related, as all febrile disorders are to each other. Professor J. P. Frank places plague in the same genus with continued nervous fever, which is, he says, a fever occasioned by causes acting especially on the nervous system, and which escape the observation of the senses; and this fever, he informs us, may be complicated with gastric and other inflammations, (*J. P. Frank*, De Curandis Hominum Morbis, Epitome, t. i. p. 30, et seq.); an opinion in which we fully concur with him; though we do not agree in thinking plague a mere variety of continued nervous fever or typhus, but, on the contrary, we deem it an independent disease which preserves its character in all climates and situations in which it may exist.

The strongest analogy with plague which we have any where found occurs in the following example of disease, induced, as it would appear, by exposure to the effluvia of common putrefying animal matter.

An American merchant-ship was lying at anchor in Whampoa Roads, 16 miles from Canton. One of her crew died of dysentery. He was taken on shore to be buried. No disease of any kind had occurred in the ship from her departure from America till her arrival in the river Tigris. Four men accompanied the corpse, and two of them began to dig a grave. Unfortunately they began in a spot where a human body had been buried about two or three months previously. The instant the spade went through the lid of the coffin, a most dreadful effluvium issued forth, and the two men fell down nearly lifeless. It was with the greatest difficulty their companions could approach near enough to drag them from the spot and fill up the place with earth. The two men then recovered a little, and with assistance reached the boat and returned on board. On the succeeding morning, they presented the following symptoms: very acute headach, with a sense of giddiness and dimness of sight, (which had existed more or less from the moment of opening the grave;) eyes of a peculiar muddy appearance; oppression about the præcordia; dull heavy pain in the regions of the heart and liver, with slight palpitation at times, and fluttering pulse; sense of extreme debility, with occasional convulsive or spasmodic twitchings of the muscles of the lower extremities; nausea; slight diarrhœa; rigors, succeeded by flushings of the face, neck, breast, and upper extremities; tongue white and much loaded; pulse from 110 to 120, weak and irregular; urine scanty and high-coloured, and skin sometimes dry, sometimes covered with a clammy sweat. On the fourth day from the commencement of the attack, numerous petechiæ appeared over the breast and arms, and in one of the patients a large bubo formed in the right groin, and another in the axilla of the same side, which speedily ran to suppuration. To one, the disease proved fatal on the evening of the fourth day; to the other, on the morning of the fifth.

On examination after death, in both cases the vessels of the brain were found loaded, and an effusion of lymph existed between the tunica arachnoidea and pia mater; there was an unusual quantity of fluid in the ventricles, and upwards of three ounces of dark-coloured liquid at the base of the brain. The optic nerve of the right side, in one of the patients, was surrounded, where it emerges from the thalamus, by a portion of gelatinous matter, and appeared thickened and discoloured; and the surface of the brain was very vascular. The heart in both cases was much enlarged, and distended with blood. In one case, five ounces of a dark-coloured fluid flowed from the pericardium when slit open, and the vessels on its internal surface were gorged with blood, and this was indeed the case throughout the whole portal circle. The stomach, near its pyloric orifice, was thickly beset, in one case, with small purple-coloured spots. The intestines in several places assumed a brownish appearance, as likewise the omentum. There were numerous petechiæ on the surfaces of both bodies. In one of the cases, the medulla spinalis, in the dorsal region, to the extent of three or four inches, was of a light brown colour; and in the other case it exhibited evident marks of congestion throughout. Most of the inguinal and axillary glands were enlarged and hardened, and several of them, when cut into, contained a light straw-coloured matter. No other morbid alteration of structure existed.

One of the two men not immediately engaged in digging the grave was attacked on the eighth day from his being on shore. The symptoms resembled those in the preceding cases. For three days previously to the avowed attack of illness, there had been pain and enlargement of one of the inguinal glands, which, at the period he was visited, had acquired the size of a hen's egg; and early in the disease the breast and arms were covered with petechiæ. By active treatment this person recovered, as likewise did the fourth man, who had slight indisposition of no decided character. (Medico-Chirurgical Review, N. S. vol. ii. p. 202, et seq.)

Systematic writers have generally been more struck with the analogy between plague and eruptive diseases, than with its relation to typhus or any form of idiopathic fever, and hence it is universally found in nosologies placed among the exanthemata. But this analogy is not so complete as to cause it to be ranked among diseases which attack persons but once in the course of their lives. Popular opinion in the Levant,

where plague may be considered almost endemic, imposes this limitation on the disease, — an error not destitute of advantage, as it prevents the sick from being deprived of the requisite attendance; and the kind of confidence it is calculated to inspire is to a certain extent justifiable, as second attacks are unquestionably rare. Dr. Russell informs us, for instance, that he met with only twenty-eight examples of well-ascertained re-infection in four thousand four hundred pestilential cases. This accurate observer cautions us, however, against regarding this as the precise proportion in which second attacks occur, there having been no plague at Aleppo for eighteen years previous to the appearance of the epidemic he describes; and he found great difficulty in obtaining accurate information, after so long a lapse of time, as to the sickness of his patients, or their exemption from disease, during the former visitation; and the number stated must be understood to comprise the double attacks which took place from 1760 to 1762 only.

This opinion of the liability of sufferers from plague to second attacks, is not universal among writers on the subject. The Chevalier Butel, for instance, is of opinion, from personal observation, that an attack of plague in Egypt furnishes complete exemption from all future accidents of the same nature, though, with some inconsistency, he subsequently quotes the case of an English physician, (perhaps he alludes to Dr. Whyte,) who died of the natural disease six months after an attack he had inflicted upon himself by inoculation. (Journal Universel, Jan. 1826.)

Authors on plague, however, who at all revert to this question, are almost unanimous in regarding second attacks as, at least, occasional, if not frequent occurrences. Diemerbroeck mentions several, and, among others, that of a Chevalier Schabhals, a bold and rash man, who was attacked with the prevailing disease, indicated by violent fever, a bubo in the groin, and three carbuncles, from which he had the good fortune to recover. He consequently became so presumptuous as to neglect all precaution, and was again attacked, five weeks after his complete convalescence, with the malady, of which he died before the sixth day. (De Peste, lib. iv. hist. 37. 45.) There is reason to think that some writers have exaggerated the proportion of second attacks from not having duly discriminated such attacks from relapses; thus it has been urged in evidence of the frequency of second invasions, that *convalescents* employed as nurses about the sick, both at Marseilles and with the French army in Egypt, were frequently attacked and perished; but a sufficient number have been noticed by judicious observers to warrant our concluding that plague does not impart that kind of security from second invasions which is afforded by small-pox and certain other exanthemata.

Diagnosis. — Difficulty will never be experienced in discriminating a well-marked example of plague from any other disease, provided the practitioner have an opportunity of observing it throughout its course: for the buboes, carbuncles, and other external affections attending it, constitute, with the intense fever, a group of phenomena which belongs only to this malady. But, on the first appearance of an epidemic, a difficulty, arising from various circumstances, has not unfrequently been experienced in pronouncing on the character of the disease. In the first place it often happens that the early cases belong to the intense type, in which death occurs before the characteristic eruption has time to display itself; and, again, even in cases which ultimately assume the normal form of the disease, a certain period elapses before buboes, carbuncles, or other external marks appear. The symptoms on which—the eruption excepted—most reliance is placed for discriminating plague, are the peculiar inflamed appearance of the eyes, which was previously mentioned, swelling of the tongue, difficulty of articulation, and tottering gait. Of these phenomena, the Chevalier Butel declares that the two first are never absent in any case of plague; but it seems more than questionable whether they belong so exclusively to this disease, that we could pronounce from them alone on the nature of any case we might witness, especially at the commencement of an epidemic, unless our diagnosis were aided by extrinsic circumstances; such as our being aware of the arrival of persons or goods from infected districts, of the sufferers having had intercourse with such persons, or having been exposed to effluvia from the goods, &c. Should such circumstances be shown to have occurred to the subject of a suddenly fatal disease, it would certainly be advisable to act on the assumption of its being pestilential, and to take the precautions which the safety of the community requires. Prudence would dictate, also, that suspicious cases, which do not terminate so rapidly, should be kept secluded for a period sufficiently long to allow their real character to manifest itself, more especially if the disease occurred in a country or district of which the geographical or commercial relation with territories in which plague was prevailing was such as to render its importation a probable event.

Mortality and Prognosis.—Plague is one of the most fatal diseases which afflict human nature; and the general prognosis in the event of its introduction into any place must be in the highest degree unfavourable, unless the early cases admit of being so totally secluded that any general contamination of the inhabitants may be prevented. Very accurate statistical details, from which we may estimate the amount of ravage it generally commits in proportion to the number affected, or to the population of the place or district in which it prevails, are scarcely to be procured, since plague has not proved in modern times a disease of the more civilized nations of the world; and it is only among a civilized people, and at a very recent period, that any thing like very precise records of the fatality of disease is to be found. But such information as we possess leads to the conclusion that of those attacked with plague, fully fifty per cent. perish. At Marseilles, for example, in 1720 and 1721, it is calculated that of a population of 90,000, 40,000 fell victims to the disease, though more than 10,000 are supposed to have escaped infection, (Traité de la Peste, p. 464;) whilst the following returns from the hospitals, and, as it would seem, from certain corporate bodies, show a rate of mortality higher than this general average:

	Received.	Died.
L'Hôpital de la Charité, from the 3d of October to the end of February.....	1013	585
L'Hôpital de Jeu de Mail, from October to the 3d of July.....	1512	820

Of 100 manufacturing hatters, there died 53; and of 134 house-carpenters, 84. The tailors, who were in number 138, lost 78. Of the shoemakers, who were 200, there died 110; the cobblers were reduced from 400 to 50; and of 500 and odd masons, there perished 350. Of persons in a still lower station of society, such as porters and chairmen, the mortality was very great indeed; scarcely a sixth part remaining at the close of the epidemic. (Relation Historique de la Peste de Marseille, p. 437, 438.)

In the capital of our own country, the ravages of plague have occasionally been very great. Thus, of the last five epidemics, those which prevailed between the close of the sixteenth and the latter part of the seventeenth century, there perished, in that of 1593, between March and December, 11,166; in that of 1603, the mortality amounted, between the same periods, to 29,992; in that of 1625, to 34,754; in that of 1636, commonly called—not from the amount or rapidity of its fatality, but from its having lasted twelve years—"the great plague," 11,000 died between April and December of the first year; and in that of 1665 the mortality, for the same period, amounted to 69,602.* But the estimates transmitted to us furnish neither the proportion of deaths to the number treated, nor to the amount of population amid which plague prevailed; for it was so customary for individuals to fly from London on its first appearance, that population returns, however accurate, fail to supply the requisite information on the second point. Defoe (but we do not regard him as very precise authority) estimates at two-thirds, the proportion of the population of London which fled in 1665. Thus much seems certain, that these returns record a difference in the amount of mortality in the same place but in different epidemics, which no supposable variation, either in the amount of stationary population, in the number of fugitives, or in both conjointly, can possibly explain.

It thus appears that we are deficient in statistical details whence to draw a general prognosis, and that, even if we possessed them of the utmost accuracy, (epidemic visitations of the disease varying so much in intensity even in the same district,) they would not furnish secure grounds for estimating the probable danger to a population from an attack of plague. Observers, however, are almost unanimous in marking in every epidemic three periods at which the fatality, and consequently our predictions, must vary. At the beginning of a pestilence, the disease, though less diffused than it subsequently becomes, appears in its most fatal form; during the increase and height of an epidemic, though many more persons are attacked, the comparative mortality is diminished; and during its decline there is a decrease at once in the numbers attacked and the proportion of deaths. A curious anomaly is, however, pointed out by Dr. Russell, in the last-mentioned law of the disease, namely, that persons in constant communication with the sick, who have resisted infection in the most contagious stages of the pestilence, are sometimes attacked in its decline. (On the Plague at Aleppo, p. 262.)

The circumstances which, independently of the period of an epidemic, should influence our prognosis, must be found in the age and general constitution of patients and the symptoms of the disease. On the former head it is important to remark that young, robust, and vigorous adults are more prone to plague, and are more frequently its victims when attacked, than feeble and valetudinary males, and women and children. (Histoire Médicale de l'Armée d'Egypte, p. 78. Jackson on the Plague of Morocco.) Women often appear to owe their recovery to the supervention of menstruation; but it may be questioned whether this occurrence is not rather an indication of returning health than the cause of it. Of the different forms of the disease which we have endeavoured to describe, that in which the febrile commotion is slight, the system appearing to be overwhelming from the commencement, and not possessing sufficient vigour to throw out the eruption, is the most hopeless; whilst in the mildest degree of the disease, indicated only by the existence of bubo, a favourable result may be always calculated on, unless some gross error of regimen be committed to aggravate a slight into a serious disorder. In an affection of an intermediate degree of intensity, the result can rarely be predicted in an early stage. When there is an amelioration of symptoms with subsidence of delirium on the fifth day, we shall generally find a critical and favourable termination on the seventh; and it is commonly remarked that the fact of the patient's surviving till the eighth furnishes grounds for a favourable prognosis. Intense fever with unabating delirium, attended by the three forms of eruption, —buboes, carbuncles, and petechiæ,—indicates a very dangerous disease, from which recoveries are rare, death frequently occurring from the third to the fifth day. Inferences as to the result may be sometimes drawn from individual symptoms. A copious eruption of buboes is not deemed unfavourable; but buboes and carbuncles conjointly in great numbers betoken a dangerous disease, and one which the constitution frequently proves unable to contend with; and the prognosis is still more unfavourable if petechiæ are superadded. A firm and resisting bubo is a good omen, even though it should have a carbuncle in the centre; whilst one of a soft and yielding consistence is thought to be less favourable. Hiccough, convulsions, cardialgia, diarrhœa, and colliquative sweats, are grounds for an unfavourable augury.

Causes.—So much were early observers of this disease impressed with the evidence of its infectious nature, that in the writings of many of them, the words plague and contagion are used synonymously;† and from this kind of metonymy con-

* Graunt's Natural and Political Observations, &c. London, 2d edit. 1662. A Collection of very valuable and scarce Pieces relating to the Plague, p. 81, London, 1721. London's Deliverance predicted by John Gadsbury, London, 1665. Russell on the Plague, p. 274, 275.

† —— patet et pestem esse omnium morborum qui contagione serpunt, etiam ad distans, contagiosissimam, unde à nostris contagionis solo nomine subauditur *Guill. Beaumontensis*, de Peste, lib. i. 1629.

siderable confusion pervades the works of certain able authors, and among others those of Dr. Read. But how conclusive soever this evidence may be to the majority, there have existed persons, both in ancient and modern times, disposed to deny its validity; and on this account we think it advisable not to confine ourselves to the bare assertion of the fact that plague possesses a contagious property, but to adduce examples of it which may prove of sufficient force to convince those who might be influenced by the doctrines of certain very well-intentioned but dangerous speculators.

We have already quoted the opinion of M. Foderé, that plague may be generated by the abundant endemial causes existing in Egypt, which this writer in common with many others regards as the father-land of the disease. Having had no opportunity from observation of verifying or refuting this opinion, we shall leave it a matter undecided, whether all the visitations of plague arise from a permanent stock of human contagion, occasionally receiving increments from the subjects of the disease, when the atmospheric influence is favourable to its diffusion, and occasionally lurking in fomites to burst forth at a suitable season; or, whether the malady is engendered from time to time by the endemial causes we have mentioned, and there is consequently a reproduction of the contagious principle in Egypt. But though disposed to leave this question undecided in the case of Egypt or other eastern realms in which plague seems to be naturalized, we must express an opinion that its appearance in Western Europe has been owing to imported contagion—an opinion which is supported by a host of the greatest authorities that are to be found on this or any other question of pathology. Sydenham, though by no means inclined to exaggerate in any case the influence of contagion, and considering the co-operation of a peculiar atmospheric disposition or constitution essential to the diffusion of plague, yet thinks this pestilential constitution inadequate to its production without importation by fomites or the arrival of a diseased person from an infected district.* To the authority of Sydenham might be added that of Mead and others of the greatest reputation in medicine; but in a question of this nature we prefer to the weight of great names, facts illustrative of its importation, and of its possessing contagious qualities not exceeded by those of any disease whatsoever, and sufficient to account for its diffusion through countries not guarded against it by rigorous quarantine.

The proofs we shall adduce of contagion will be derived principally from the history of the plague at Marseilles in 1720, this being one of the most accurately reported of European epidemics. Its importation into the city appears to have taken place by means of a vessel commanded by Captain Chataud, which left Seyde with a rich cargo on board on the 31st of January, her bill of health being clean, by which is meant that both the place and the ship were free from the disease at the time of sailing; but it was afterwards learnt that it existed avowedly in the town a few days after. The vessel then touched at Tripoli, which is near Seyde, and had constant communication with it, in order to undergo some repairs. Here additional goods were taken on board, and some Turks embarked to be conveyed to Cyprus. One of these Turks fell sick and died in a few days. Two sailors who touched the dead body sickened and died after a short illness, and in a few days after other two persons, one of whom was the surgeon of the vessel, took the disease and likewise died. The captain, becoming alarmed, secluded himself from his crew, and three more men falling sick, and there being now no surgeon on board, the vessel was put into Leghorn. The disease of the three men last attacked was fatal at Leghorn, and Captain Chataud received from the medical men of the place a certificate that they died of pestilential fever. The ship reached her ultimate destination, Marseilles, on the 25th of May, and was put under quarantine of merchandise for forty days. On the 27th another of the crew died. At this time three other vessels from the same suspected places arrived, those of Captains Aillaud and Fouque, and the barque of a second Captain Aillaud. On the 12th of June the vessel of a Captain Gabriel likewise reached Marseilles from the same ports. These ships had all foul bills of health, declaring that at the time of their departure there was a suspicion of plague. The goods of all these vessels, as well as those from Captain Chataud's ship, were landed in the infirmaries for purification.

The disease and mortality continued on board of the first vessel. On the 12th of June the individual placed on board as a guard during the quarantine died, and on the 23d a cabin-boy sickened, and at the same time two porters employed in the purification of the goods, and subsequently a third similarly occupied with those of Captain Aillaud. The disease in all these persons was the same, and all died in two or three days. On the 5th of July two porters, shut up with the merchandise of Captain Chataud, were attacked, and had buboes in the axillæ; and some days after the priest who administered the sacrament to these men died. The passengers from all these vessels, even those from Captain Chataud's ship, were admitted into the town on the 14th of June with their baggage and private merchandise, after their persons and goods had undergone *fumigation*.†

The first case in the town occurred on the 20th of June, and on the 28th of the same month a tailor was attacked and perished, with his whole

La peste, uno dei piu terribili mali che possano affligere il genere umano, benche non sia propriamente lo stesso che il contagio, pure suole avere fra noi il nome di contagio perche toccare i corpi, o l'aria degli appestati; o le merci, o robe, loro, se ne infettano i sani, con piu forza e strage che non accade in altri morbi, epidemici et attacaticci—il perche contagio suo l'anche appellarsi la peste. *Muratori*.della Peste, edit. 4. 1743.

* Interea aëris dispositionem quantumvis λοιμώδη pesti suscitandæ per se imparem esse vehementer suspicor; quin pestilentiæ morbum alicubi semper superstitem aut per fomitem, aut per pestiferi alicujus appulsum, e locis infectis in alios deferri; ibidemque, non nisi accedente simul idoneâ aëris diathesi popularem fieri.—*Sydenhami Opera*, sect. ii. cap. ii.

† The expression in the original is "parfums." The nature of these perfumes is not mentioned, but the author of the Relation Historique censures the quarantine department for their excessive confidence in them, and the neglect of ventilation. (Relation Historique de la Peste de Marseille, p. 35.)

family, after a few days' illness. On the 1st of July a woman named Ligazière, living at the foot of the Rue de l'Escale, was attacked with the disease, and had a carbuncle on her nose; and immediately after, a woman named Tanouse, in the neighbourhood, took the disease, and had buboes, and from her the whole street appeared to have become contaminated, the contagion invading first the houses adjoining that of Tanouse. (Relation Historique de la Peste de Marseille, p. 26—38.)

It was from this street (Rue de l'Escale) that the disease was introduced into the Hotel Dieu, through which its progress is one of the strongest evidences of contagion that is to be found any where recorded. This hospital was closed against pestilential cases and all that had communication with them, it being intended to reserve it for the patients who occupied it at the time of the breaking out of the disease, those who might be attacked with other disorders besides plague, and between three and four hundred children (enfans trouvés) who were its permanent inmates. A woman, who had escaped from the street we have mentioned, applied for admission, and either the characteristic marks of plague not having appeared, or having escaped the observation of the examiners, she was supposed to labour under ordinary fever, and was received into the house. She was conveyed by two girls into the women's apartment, and the principal nurse changed her linen. On the following day the two girls sickened, and died after an illness of six or eight hours; on the day after this, the nurse became ill and died almost as suddenly. From these four patients the disease spread rapidly through the house, and *all its inmates*, directors, confessors, physicians, surgeons, apothecaries, and all the other officers, servants, and nurses *perished*, excepting thirty of the children, who were the sole survivors from a number of persons amounting to between five and six hundred. (Relation Historique, p. 94, 95.)

The effect of seclusion was exemplified in the case of the convents of nuns, all of which cut off communication with the town, and remained exempt from the disease throughout the whole of the pestilence. The Poor-House (La Charité) adopted the same precaution, and enjoyed the same exemption till the end of September. It was then converted into a pest-hospital, its original inmates being removed with the exception of a few who were retained as nurses; of these almost all perished. (*Deidier*, Traité de la Peste, p. 353.) The exemption imparted to religious communities by seclusion was strikingly contrasted with the ravages of the disease amid the orders of ecclesiastics who were employed in offices about the sick. Of the order of capuchins, who furnished a great number of confessors to the town and hospitals, forty-three perished, out of the whole body of fifty-five. (Relation Historique, p. 177.)

The contagious nature of plague is strongly exemplified, in the early stage of epidemics, by the gradual manner of its diffusion, the paucity of the attacks at the commencement, and their slowly increasing in frequency, till, foci of contagion being multiplied, vast numbers are invaded at the height of the disease. The rarity of the early invasions at Marseilles, and the havoc it ultimately committed, have been described. A similar mode of progression is observable in all epidemics of plague. In that of London of 1603, the number of deaths were progressively as follows: in March 11, April 26, May 83, June 362, and July 2999; in that of 1625, in March 23, April 85, May 224, June 954, July 5887; in that of 1636, April 37, May 162, June 440, July 456, August 1239, September 3856; in that of 1665, April 2, May 43, June 1060, July 5667.

We need not, as it appears to us, enlarge further on the evidence of contagion in plague, enough having, we trust, been adduced to convince the most sceptical. It appears transmissible from individual to individual in all the ascertained modes in which diseases are thus communicated; by contact, inoculation (from the matter of buboes), through the atmosphere, and by fomites. Observers have endeavoured to illustrate certain obscure points in these different modes of transmission. Thus, with regard to the matter of buboes or of sinuous ulcers consequent on them, it has been conjectured that its contagious property ceases before the healing of the sore; but no precise conclusion having been attained regarding the period when this cessation takes place, Dr. Russell advises that all pestilential ulcers should be held infectious till after the expiration of two months from the first attack, and the patient secluded accordingly. The contagious distance from the person of the patient has been matter of discussion, some persons imagining that a degree of proximity almost equivalent to contact is necessary for the communication of plague; but there is reason to think that this circumscription is much narrower than facts justify us in drawing it; though it is probable that the effluvia when once transmitted into pure air are soon blended with the common mass, and suffer such alteration as renders them innocuous at no great, though not an ascertained, distance from the patient. At what period of the disease the communicable property commences, and how soon after convalescence it ceases, are points which may be considered quite undecided. The most accurate observers are of opinion that consciousness of receiving infection, a feeling occasionally discerned in ordinary contagious fever, does not occur in plague. (*Russell*, p. 302.) When received, it does not hang ambiguously about a person in any case for more than two or three days, but its operation once announced by visible signs of disorder, the progress of the disease is rapid, there being a difference in this from the course frequently observed in typhus, in which the effect of contagion on the system is frequently manifested by slight indisposition, sometimes lasting for weeks, previously to the complete formation of the disease. (See Contagion.)

It would be desirable to ascertain the duration of the latent period of pestilential contagion from its reference to the safety of intercourse between infected and healthy districts; but the information to be obtained on this important question is of a very unsatisfactory nature. Only at the beginning of a pestilence, when foci of contagion are rare, can any attempt be made to illustrate it, and hence the data are too scanty to furnish a conclusion which can be implicitly relied on. Dr. Russell has known the disease sometimes manifest itself a

few hours, and in some cases two or three days after intercourse, and is disposed to consider that infection rarely remains latent beyond ten days; but he acknowledges that wider experience is required to determine positively the latter point. The period during which contagion may adhere to unventilated goods appears as unascertained as the latent period in the case of persons; but many circumstances lead to the belief that it is of considerable length.

The question has been raised whether dead bodies have an infecting power, and M. Desgenettes answers it positively in the negative; but there is much reason to think that this decision is too general, however warranted by the experience of its author. During the pestilence at Marseilles, burying the dead was found so dangerous an operation, that free persons could not be procured to perform it, even for an enormous recompense, and consequently the galley-slaves were employed, on a promise of liberty when the duty should be completed. They were sent out in detachments. The first, consisting of twenty-six, were all attacked with the disease in two days, and successive numbers were sent on the duty, till, from the 20th to the 28th of August, one hundred and thirty-three had been employed, when the officers of the galleys refused to send any more, almost the entire number furnished being either sick or dead. It was likewise observed in the plague of London of 1665, that officiating at funerals was an office fraught with extreme peril.

Certain conditions of the atmosphere influence the diffusion of the contagion of plague, or the susceptibility of bodies to be affected by it. Of these, the most manifest is temperature, extremes in this respect checking, and warmth within a certain degree appearing to favour, the propagation of the disease. It hence occurs that the abatement of pestilence in the east takes place during the heats of summer, and in Europe in winter. Popular superstition among the Christians resident in Europe, fixes on St. John's day as the exact period of the cessation of pestilence: we scarcely need remark that this opinion is much more precise than is justified by facts. The following, according to the most accurate observers, is the ordinary course of the diminution and ultimate disappearance of plague in the Levant. There is a manifest abatement of the disease at the commencement of the summer heats, and in proportion as these continue and increase, cases become more and more rare, and finally cease; while contaminated goods lose at the same time, as we are informed, their infecting property. The uniformity in this course is so great that Christians who shut themselves up during pestilence, almost always come abroad in June, the instances being very rare in which they remain confined to July. Epidemics in Europe have generally commenced in spring, or in the beginning of summer. Autumn has frequently been the period of their greatest prevalence and fatality, and they have either been totally extinguished in winter, or have then received a very considerable check, and have finally ceased in the early part of the ensuing spring. The great plague which prevailed in London from 1636 to 1648, presents an exception to this rule; but during this extensive period there was invariably a diminution of cases in winter, though at no time a cessation of the disease.

Independently of manifest atmospheric conditions, that inscrutable state of the air to which the term epidemic constitution has been applied, so much influences the propagation of plague, that certain very experienced writers have denied its possessing a communicable property, unaided by this atmospheric peculiarity. In illustration of this view, Dr. Russell informs us that experience in Turkey, where generally no precautions are taken in times of pestilence, clearly evinces that in a certain state of the air a communication with infected places may subsist without any material consequences. The return of plague at Aleppo happens at irregular periods; the intervals are of considerable but unequal length; and in these, the commerce with Egypt, Constantinople, and Smyrna, remains uninterrupted. In the intervals between 1744 and 1760, and from 1762 to 1780, the plague raged several times in the places now mentioned, without affecting Aleppo; and even in two or three years subsequent to 1762, though it was at Marash, as well as other places not far distant, with which Aleppo has continual intercourse, no instances were discovered of communicated infection, and this exemption continued, notwithstanding that infected families from some of these places took refuge in the town. It would appear, moreover, that this constitution, favourable to the progress of plague, varies considerably in degree. Thus we learn from the able author last quoted, that the progress of plague at Aleppo was exceedingly restrained in 1760; it was much more vigorous in 1761; it raged with great fatality in 1762, and in this year was finally extinguished, though there was no appreciable difference in the state of the seasons in the respective years to explain the varying diffusion of the disease, or its ultimate extinction. To the cessation of this atmospheric condition, which is known only by its influence on the propagation of disease,* is to be ascribed the occasionally sudden and otherwise inexplicable disappearance of plague in oriental countries, where no disinfecting process is employed. Much, too, that ought rather to be attributed to a change in this latent state of the atmosphere, is frequently ascribed in other countries to disinfecting processes, which are in truth rarely so general or efficient as to account for the cessation of pestilence.

[So many contradictory statements of "facts" have been brought forward, that it is difficult to form any exact opinion either as to the origin or the extension of plague. It is certainly an endemico-epidemic, and this inference is confirmed by the influence of season, which, in plague countries, is a common topic of observation. We have said, that the decrease of plague in the East towards the middle of June is so remarkable, that at Cairo, St. John's Day, which is the 24th of June, is ever understood amongst the superstitious inhabitants to put a period to the disease. The uniformity of its decrease as the summer advances is so

* At vero quæ qualisque sit illa aëris dispositio, a quâ morbificus hic apparatus promanat, nos pariter ac complura alia, circa quæ vecors ac arrogans philosophantium tubra nugatur, planè ignoramus.—*Sydenhami Oper.* sect. ii. cap. ii. p. 107.

marked, that persons, who have previously confined themselves, come forth invariably on that day, mix with other people, transact their ordinary affairs, and restrain themselves, in no respect, from any apprehension that they may take the disease. But although plague is evidently dependent upon locality and season, it has been supposed that a principle may be given off from a plague patient, which, if concentrated, — as in very malignant forms of the disease, and in pent-up situations, where proper ventilation is impracticable,—might cause it in a healthy individual. Such—as the writer has said elsewhere, (*Practice of Medicine*, 2d edit. ii. 509,)—*may* be the case; but by many, who have had ample opportunities for observing the plague, it has been denied,—and the negative view is strengthened by facts communicated to the English Admiralty by Sir William Burnett.

In a recent work, Dr. John Davy, (*Notes and Observations on the Ionian Islands, &c.*, London, 1842,) gives many examples to show that, taking it for granted that the disease is contagious, it is but very slightly so; and hence there is a necessity for a revision of the quarantine laws, "with a fair prospect" — to use his own words — "of their being greatly mitigated, and at the same time rendered efficient, to the great comfort of the traveller, the incalculable advantage of commerce, and the universal benefit of mankind."]

Treatment.—There are few points in medicine on which greater discrepancy of opinion prevails than the mode of treatment to be adopted for conducting patients safely through this dangerous disease. Remedies which are the favourites of one class of observers, in the hands of others prove to be fraught with danger. Bloodletting, emetics, and other heroic measures, are alternately lauded as cures and censured as poisons. We believe that had any of the remedies, the reputation of which has been so fluctuating, been announced as cures for any of our ordinary epidemics, such as small-pox, scarlatina, or continued fever, without reference to the period or type of the disease in which they were to be employed, the testimony for and against them would have proved equally conflicting. The general treatment of any epidemic, independent of that required to combat local lesions, may be comprised, if we mistake not, in few words:—We must deplete the excited, and stimulate and support the sunken and collapsed; and in an immense majority of instances, the condition requiring the former means, if it exist at all, will be found in an early stage of the disease; that demanding the latter, will occur in an advanced period.

The best authorities inform us that bloodletting is to be employed at the very commencement of the disease, if the pulse possess sufficient force to render such a proceeding prudent; and some are of opinion that a second bleeding may be occasionally admissible; but that very judicious observer, Dr. P. Russell, cautions us against performing any bleeding after the third day. He mentions, however, one case (On the Plague at Aleppo, case ciii.) in which bleeding was successfully performed on the third day from both arms at once, though the patient, a female, had been bled the preceding day. The presence of buboes, which Sydenham and others have regarded as a valid objection to bloodletting, from a dread that the operation might occasion their recession, ought not, we are assured by more recent authorities, to prevent its employment, as neither the eruption nor progress of these tumours is injuriously influenced by it. Dr. P. Russell, indeed, remarked, that where the pain of buboes was excessive, bleeding was necessary to moderate that and other inflammatory symptoms, for till the fever declined, these tumours never advanced kindly to suppuration.

Many cases, however, occur, in which the collapse of the system is so well marked from the commencement that the employment of bleeding is manifestly inadmissible, and emetics are then thought the most suitable remedies. Should the first emetic dose fail to act, it is advisable to repeat it after the interval of an hour or an hour and a half. Full vomiting, we are assured, especially if bilious matter or worms were discharged, was found so efficacious during the prevalence of plague at the city of Aix in Provence, that almost all from whom such matters were ejected recovered, whilst those on whom the emetic failed to operate perished. (*Sauvages*, Classes Morborum, vol. ii. p. 368.) It is probable that the failure of emetics was not so properly the cause as the token of death, as it indicated an extremely collapsed state of the system, of which the sensibility was almost annulled by the vehemence of the disease.

Purgatives are generally regarded as suspicious remedies, from the tendency to diarrhœa being so general in the disease, and its very fatal effects; and practitioners concur in declaring costiveness to be less prejudicial in plague than other febrile disorders. The irritability of the bowels is so great, and hypercatharsis is consequently so liable to be produced by the more active purgatives, that we are advised to empty the bowels at the commencement of the disease by means of the most lenient of the class, such as cassia pulp, manna, or rhubarb, with cream of tartar. Sir Brooke Faulkner, however, employed calomel and jalap, without intimating that inconvenience resulted from the practice. (Treatise on the Plague, p. 238.)

Among the older physicians, the object of whose practice was to eliminate from the blood the noxious principle on which they conceived the phenomena of the disease depended, the more heating diaphoretics, such as contrayerva and serpentaria, were favourite remedies, whilst their operation was aided by excluding the air, heating the apartment, and heaping the patient with bedclothes. This method of treatment, so injudicious in any febrile disorder, is now universally abandoned by European practitioners. Some of the more cooling sudorifics, as liquor ammoniæ acetatis, and saline draughts, are customarily given by many physicians, and by some are thought to be beneficial. Dr. P. Russell says that saline draughts given in an effervescing state are much more efficacious in checking the retching which is sometimes a distressing accompaniment of plague than that of ordinary malignant fevers.

It has been stated that diarrhœa is a very common and very dangerous symptom. The judicious observer we have so frequently quoted, Dr. P Russell, informs us that he was at first unwilling

to administer opium for its relief, from an apprehension of aggravating the stupor or comatose disposition; but finding that this effect did not follow its employment, he used it in 1762 much more freely than he had done in former years, and in general remarked that where he succeeded in stopping the looseness early in the disease, the patient became more alert and sensibly better. In the more advanced stage, however, we learn from the same writer, astringents and opiates rarely checked or suppressed the diarrhœa. Inflammation of the intestines being one of the few pathological appearances generally recorded by authors, there can be little doubt that the diarrhœa which accompanies plague indicates some inflammatory affection of the bowels, and that local bleeding, from the integuments of the abdomen or anus, and perhaps subsequent blistering, would be found important auxiliaries in its treatment.

Coma and other affections of the brain it is customary to combat by means of blisters between the shoulders, to the nape of the neck, temples, and occiput. (*Sir B. Faulkner*, loc. cit. p. 241.) It is extremely probable that the dread of drawing blood, which is so general among those who treat this disease, is the reason why local bleeding is not conjoined with the counter-irritants to subdue the cerebral affection. From the symptoms we have detailed of the intellectual disorder in plague, there can be little doubt of its depending upon the same causes as that which accompanies other malignant fevers, and that the same method of treatment would be found applicable to both.

Certain remedies of the general febrile state, besides those already mentioned, have been tried by European practitioners in this disease. Cold affusion is thought by Sir B. Faulkner to present a considerable prospect of benefit if applied at the very commencement: this writer, however, it should be remarked, speaks from a very limited experience of its effects. Several writers speak favourably of mercury; some on merely speculative grounds; others from the analogy, real or presumed, between plague and other disorders in which they have observed that this mineral is useful;—Mr. Stafford from considerable experience. This gentleman declares that, when his regiment was infected, thirty or forty cases of axillary tumour recovered under its use, and he relates at length five severe cases of plague, of which three recovered under mercurial treatment. The mode of administering it was internally, in the form of calomel, and by inunction. The statements of this writer seem to show that the mineral may be serviceable in the treatment of the disease. (Cases by Mr. Stafford, quoted by Sir B. Faulkner, p. 245–253.)

Should the vital powers appear to be failing at any period of the disease, wine and cordials are administered, and many writers advise that they should be accompanied by tonic medicines, of which calumba, bark, and serpentaria are those most usually resorted to.

Friction with oil has been praised as a means of curing the disease, by inducing diaphoresis, and likewise as a preservative from infection. The property of inducing diaphoresis it certainly possesses; but its power of curing the disease is questioned by numerous authorities. A writer whom we have often quoted,—Sir B. Faulkner,—is equally sceptical as to its prophylactic powers. On this point he remarks: "There are so many instances of persons living in the closest intercourse with the infected who escaped without the use of oil, and so few well-attested cases of persons having come into actual contact with pestiferous matter who were protected by oil alone, that I cannot hesitate to conclude that the opinion of its possessing any independent or certain prophylactic efficacy is destitute of foundation." (Op. cit. p. 232.) Vaccination has been recommended as a means of prophylaxis. The last-quoted writer furnishes us with the following forcible argument against its claim to such a property. "I took pains," says he, "to ascertain whether those who had recently been vaccinated were rendered less susceptible; and I found that the instances of its inefficacy were every where numerous, of which I may mention rather a striking one, which was communicated to me by a Maltese surgeon, who was much employed in the plague, namely, that of a numerous family who had been recently vaccinated, the whole fell sacrifices to the prevailing contagion, with the exception of the parents, who had never undergone the operation." (Op. cit. p. 233.) For the prophylactic means to be adopted, we beg to refer to the articles Contagion and Disinfection.

The general plan of diet is the same as in other febrile disorders. Of preparations of animal food nothing stronger than chicken broth should be allowed; the rest ought to consist of preparations of farinaceous or leguminous vegetables, ripe fruits, and simple diluents, such as lemonade, toast-water, or tea.

[It is to be deplored, that all remedial agencies are too often ineffectual, owing to the malignity of the disease; and, accordingly, we are not so much surprised at the information given by Dr. Shapter, (Tweedie's *Library of Medicine*, 2d Amer. edit., i. 230, Philad. 1842,) that a recent observer, after five months' experimenting with all kinds of treatment, and all modifications of the disease, in about 1000 cases, arrived at the melancholy conclusion, that, although the medicines produced their wonted effects upon the organism, the malady neither ceased nor changed.]

The local treatment of buboes should be limited to the application of warm emollient poultices. By the older writers, who erroneously conceived that the suppuration of buboes was the cause, rather than the effect, of the abatement of the fever, various irritating measures were resorted to for accelerating the process, but sounder pathological views have occasioned them to be abandoned. When suppuration has taken place, the matter may be left to discharge itself spontaneously, or the lancet may be employed to give exit to it. Should the original aperture be too small, it should be dilated, as its narrowness is apt to give rise to sinuses. If the carbuncles require topical treatment at all, it should be of the same simple nature as that of the buboes. Prior to the forming of the eschar, a mild poultice only is required: subsequently a slightly stimulating dressing, such as unguentum resinæ, or the same with oleum terebinthinæ, may be interposed between the tumour and the poultice.

Joseph Brown.

PLETHORA, πληθώρα, *fulness*; [*Polyæmia* of Andral.]—Before entering on the discussion to which this article is appropriated, the writer wishes to guard himself against a misconception that has at times been inconsiderately formed respecting the doctrines maintained in it. Though connected with the foundations of all pathology, they are by no means intended to represent the whole of it. Pathology regards living actions, which depend on organized structure, and this both derives its nutrient elements from the blood, and returns to it the effete matter which the nutrient deposits displace. This connection—subsisting without intermission so long as life endures—is so intimate, that whatever affects the condition of the blood must immediately concern the well-being of the whole frame; whence every approach to a correct pathology of the circulation must contribute to the establishment of sound principles, and improve medical science. But pathology embraces more than the mere lesions of the blood or of its circulatory apparatus; there is a nervous system as well as a vascular, which cannot be overlooked. We wish it, therefore, to be understood, that in the following doctrines of plethora we have not the slightest intention of establishing an exclusive pathology, or of claiming for the facts and reasonings adduced a higher importance than they intrinsically merit.

The term *plethora* but ill expresses the state of constitution which it is used to designate, yet it would be difficult to substitute one more correct and appropriate. Indeed, no concise term could convey the compound idea which requires to be represented, and which involves the conception not so much of the quantity of the circulating fluid, as of the relative proportions of its constituent parts. The term hyperæmia, as being of similar import, would not be preferable even if it were not otherwise appropriated. It is applied to denote local accumulations of blood arising from congestion or determination, in which the phenomenon results solely from the increased quantity of blood, without reference to its quality, and is consequently expressed with correctness by a term representing such excess.

Plethora, though inducing a morbid condition of the body, has not in general been designated a disease, nor treated of by practical writers, save in connection with some special malady attendant on or derived from it. Linnæus has given it a place in his nosology in the class *Deformes* and order *Decolores*, and thus defines it: "Rubedo corporis a distensis vasis sanguineis, cum dyspnœa." Sagar also admits it in the class *cachexiæ*, and order *Intumescentiæ*, giving not only a definition but a description also: "Intumescentia universalis, proportionata et æquabilis ex abundantia sanguinis." "Amystidis et ventris cultus, pulsus plenus aut suppressus, venarum amplitudo conspicua, æstus et gravitas totius corporis, respirandi difficultas, lassitudo spontanea, stupor artuum, somni turbati, partes epidelio tectæ ruberrimæ, temperamentum sublaxum, sanguineum." The former of these would seem to denote rather special disease of the lungs, and the latter to characterize obesity. Neither is calculated to convey a clear or correct notion of the morbid condition which excess of blood occasions. As this condition is present in many diseases, and actually gives rise to several; and as, even in cases where it does not exist, it is of importance to be assured of the negative, it cannot but be deemed an important part of pathological science to trace the circumstances which generate a state of plethora, and the phenomena which indicate it, so as to be prepared both to recognise it when present, and to apply means suitable and adequate for its correction.

Disease is considered to exist when there is any observable deviation from health in any of the functions or structures of the body. When the whole constitution is disturbed or depraved, without any part being prominently affected, the disease is said to be general or constitutional, and according to its character is called either febrile or cachectic. If any function or organ be particularly disturbed, a name is thence affixed; and if an organ or function suffer without apparent disturbance of the general health, the disease is pronounced local. On such views have classifications of diseases been formed, yet are they wholly wanting in that precision which the productions of a nosological arrangement should indisputably possess.

When morbid symptoms of any kind arise, it is necessary to consider not only the morbid lesions which immediately produce them, but also the deviations from health in which these morbid lesions themselves originate, tracing these back to the point where deviation from health first occurs. By such investigation only can the history of disease be rendered complete, or its true pathology be established.

It is easy to understand why the investigation of disease has for the most part commenced with that period when a nosological malady is considered as formed. Until this period arrives medical aid is rarely sought for, the patient's consciousness of indisposition being aroused only when the functions of health become so impeded as to fail sensibly in their accustomed exercise. The accession is then referred in general to some exciting cause, real or imaginary, and is considered as having commenced at the time when the imputed cause was supposed to operate, a state of previous good health being assumed. Thus suddenness of accession has been regarded as a character of most acute diseases, and the period when the accession has been first observed has been regarded as identical with the commencement of disease. Yet it may be doubted whether any disease, excepting such as results from a morbific poison, ever takes place suddenly or without previous derangement of general health, cognizable by its appropriate manifestations, and capable of being corrected so as to obviate the morbid accession to which it leads. If this can be demonstrated, it is clear that this introductory stage of disease is of the highest importance, as being that to which prophylactic treatment can be most beneficially directed, and also as forming a part of the ensuing disease essential to its complete history, and without a knowledge of which its intimate nature or the series of morbid changes never can be thoroughly understood.

In tracing the progress of plethora, and the derangements of function which it occasions, it is necessary to commence at that point where the

equable and temperate exercise of all the functions of life constitutes the state which we denominate health. By this means physiology becomes connected with pathology; the actual transition of health into disease is elucidated; and a light is thus shed on morbid processes which no other source of investigation can supply. When disease has made a certain advance, and continued a certain time, so complex are the derangements resulting, that without some clue for unravelling their intricacies, an exposition of them is in vain attempted, and, as the history of physic abundantly shows, conclusions the most opposite may be arrived at in inquiries directed to the same end. This could not be the case if the several morbid changes, as occurring in the respective functions, were marked in their regular progression, so as to determine, when any one presented, what were its antecedents, what would be its consequents. Were this knowledge clearly possessed, each symptom of disease would be discriminated as belonging to a determinate train of morbid actions; and however obscured it might be by contingent or derivative disturbances, it would point out unequivocally the appropriate means of its own correction. With such accurate knowledge we should not see such ambiguity prevailing as that in certain maladies some practitioners enjoin bloodletting where others give opium and ammonia.

Almost all systematic and theoretical writers have left their inquiries incomplete; with each an important stage of the disease of which they respectively treat remains unexplained. This stage embraces the interval between the first deviation from a state of health, and the occurrence of the special lesion of which each has taken cognizance; and it is chiefly to this stage that we propose to direct attention in the following pages.

The constant unremitting exercise of the functions, the aggregate of which constitutes all that we know or can conceive of life, is attended with a physical expenditure which daily nutrition replaces. The nutritive matter taken into the stomach, and which forms the chief support of animal life, undergoes several successive changes in its passage through the body; it is digested, assimilated to the animal juices, deposited in the several structures for their appropriate nutrition, and finally, when no longer fit for supporting their healthy actions, is taken up by the absorbents and carried out of the system by appropriate excretories. It is obvious that there is a natural proportion between the ordinary waste of the body and the supply of fresh nutritive matter, and that if the latter be either too sparing or excessive, the functions of life must undergo some deviation from their healthy exercise.

Considerable variations are liable to occur in the quantity and quality of food which any individual consumes, in the assimilating processes by which what is taken into the stomach is animalized and fitted for repairing the waste of the system, and in the several secretions in which the blood is expended. If more food be assimilated than the ordinary waste of the body requires, a state of repletion must be the natural and inevitable result. But repletion may also take place under a moderate and even abstemious use of food, when, from sedentary habits, inactive life, or other cause, appropriation of blood by the nutrient and other secretions is languid and inefficient. As repletion, then, may take place under very different circumstances, so is its presence marked by different phenomena. Whenever it arises, one of two consequences is sure to result; either it excites the several functions, if sufficiently healthy and vigorous, to increased actions leading to its speedy appropriation and removal; or, if these be weakly and unable at the moment to institute and support those increased actions by which the redundant matter is to be appropriated and expelled, then, oppressed by a labour to which they are unequal, they manifest a decline of even their ordinary power, and all the outward phenomena of debility are displayed. To discriminate this state from one of real debility arising from exhaustion of animal power, or from defective nutrition, is a matter of practical importance not inferior to any which medical science may be engaged in illustrating.

When redundancy of nutriment takes place in a healthy constitution, its earliest effects manifest what may be termed rather exuberance of health than a state of disease. The several functions of the body are more vigorously performed, the nutrition of its several structures is more abundant, and it acquires increase of bulk, especially if the habits of life are not of an activity capable of increasing excretion to a degree proportionate to the nutriment inordinately supplied. And if the excess be casual or inconsiderable, the self-adjusting powers of the body are amply sufficient to dispose of it so as to prevent the transition of healthy actions into diseased. If from extent or continuance the excess be such as to urge these powers beyond a certain point, then their conservative energies fail and irregular actions of various kinds take place, laying the foundation of a large proportion of the specific diseases to which the human body is liable. The general character of diseases so induced is inflammatory. They are marked by a quickened circulation, increased heat, and a more or less depraved state of the several functions. According to the predisposition of the system, hereditary or acquired, to the accidental weakness of particular parts, or to the casual excitement to which the body may be exposed, is the specific form of the ensuing disease determined. For this diseased condition the means of essential relief are, depletion and abstinence; the one to remove or abate the original cause of distemper,—the other to prevent its recurrence. There can be little doubt that the process of nature here referred to, though generative of what we term disease, is yet intrinsically sanative; its object being to dispose by increased energies of that which the ordinary powers are unable to appropriate and the continuance of which is inconsistent with their healthful exercise.

When repletion occurs in a habit of less natural vigour, the self-adjusting powers are not so successful in effecting early restoration, and inflammatory actions are more tardy in their accession. The interval which precedes the occurrence of morbidly increased actions is one of peculiar interest, because its phenomena are of an equivocal character, resembling in many respects those which belong to a very different state of the sys-

tem, and hence liable to be misunderstood; and more especially because they have hitherto been very imperfectly investigated.

The two kinds of plethora here described may be conveniently distinguished by the terms *absolute* and *relative;* the former implying that the redundancy exceeds what the healthy state of the individual constitution would require or bear; the latter that, without being absolutely excessive, it is relatively so in reference to the deficient powers of the constitution for appropriating or otherwise disposing of it. Absolute plethora would thus correspond with the *plethora ad molem, ad vasa, ad venas* of systematic writers; and relative plethora to the *plethora ad vires.* With respect to the *plethora ad spatium,* or that referred to reduced capacity of vessels, the actual quantity remaining the same,—or the *plethora ad volumen,* arising from increase of bulk without actual increase of quantity, it would serve but little purpose to notice them in a practical treatise; the former being resolvable into relative plethora, and the latter, if it ever take place, being only a transitory effect of a temporarily operating cause, such as increased temperature, by which the volume of the blood was supposed to be expanded. The distension of vessels, however, from which this expansion was inferred, was much more probably occasioned by the excitement of the arterial system caused by the stimulus of heat. It is questionable whether a real plethora ad volumen ever occurs except in the instance of persons ascending great heights, at which the diminished pressure of the atmosphere seems to give rise to some such effect.

The subject of plethora might be comprised under the heads of absolute and relative; but its discussion would not then be complete, for so continually is nutritive plethora combined with another source of vitiation of the blood, that it is impossible to do justice to the one subject without at the same time illustrating the other. This vitiation takes place when under moderate nutrition there is defective excretion; in which state the system is oppressed, not so much by the quantity of nutriment, or the labour of disposing of it, as by the load of excrementitious matter with which the blood is overcharged. The phenomena and treatment of this condition of the body are also of high interest, and deserving attentive and mature consideration; for unless its nature be clearly understood, the treatment must be purely empirical, and its success precarious and incomplete. Each of these morbid conditions will now be considered; and the discussion will, we trust, assist in reconciling some of the apparent anomalies and inconsistencies with which medical practice is so frequently charged.

I. To the first of these conditions, or that of absolute plethora, belong all the cases of pure inflammation which we daily witness. It is usual, when these occur, to refer them almost exclusively to the exciting cause which may have immediately produced them. Yet the fallacy of the conclusion must be obvious when we reflect that, of several individuals exposed to the same exciting cause, scarcely two will be affected alike. From exposure to cold, for instance, one will be attacked with catarrh, another with rheumatism, a third with inflammation of the bowels, a fourth with sore throat; while by far the greater number will escape altogether. Were the exciting cause solely chargeable with these several effects, they would unquestionably be marked with greater uniformity. The truth is, that the exciting cause produces its effect because the body exposed to it is prone to be morbidly affected in consequence of its own previous derangement; and the specific form of the disease is determined, partly by the operation of the exciting cause, but chiefly by the predisposition of the parts affected to undergo those morbid actions to which the general indisposition of the system and their own partial weakness render them liable.

To distinguish by its appropriate phenomena that condition of an apparently healthy body, which subjects it to be affected by slight exciting causes, must be an important part of medical knowledge. This state and these phenomena the writer of this article endeavoured to explain and illustrate at some length several years ago. He then made known the course of inquiry by which he was led to investigate these phenomena, and to trace them backwards to the point where health first passes into disease. His earlier observations were conducted on what occurred in his own person, at a time of life when he was prone to severe attacks of inflammation, and when regard for his safety compelled him to watch vigilantly the premonitory indications so as to anticipate the approach of inflammation, and by timely interference avert its more severe accessions. By close attention he was enabled to detect those indications in certain derangements of functions sufficiently clear and undeniable when noticed, but which might, on superficial examination, be overlooked or regarded as trivial and insignificant. The success of his early endeavours to arrest advancing disease encouraged him to observe still more closely, and detect at still earlier periods, the morbid actions introductory to inflammation; in which way he progressively ascended to the higher links in the chain of causation, availing himself always of the knowledge thus acquired so as to apply means of relief at the earliest period when a necessity could be perceived; and with such effect that he succeeded thoroughly in subduing a liability to inflammation, from which he had suffered repeatedly and severely for several years. Engaged in hospital duties of some extent, he had ample opportunity of making corresponding observations in a tolerably wide field of practice; and the result was a full confirmation of all that the experience of his own case had taught him. From the principles thus deduced, the writer has derived much valuable guidance in the investigation and treatment of disease for more than twenty years; an experience which may be considered as justifying some confidence in now again submitting them to the profession through the medium of a work devoted to practical medicine. To detail here the analytical processes of inquiry from which this experience was derived would extend the present article beyond its allotted limits. Premising, therefore, that it was from research so conducted the following information was obtained, we shall proceed to state synthetically what we believe to be the course of morbid actions con-

sequent to and resulting from redundancy of nutritive matter in the blood, both absolute and relative.

We have stated that absolute plethora is the parent of pure inflammation. If there be no plethora, inflammation will not be excited by slight causes; or if it be aroused through the operation of an exciting cause, it will be mild and easily subdued. The severity of inflammation, too, will, *cæteris paribus*, be proportionate to the degree of plethora pre-existing. Previously to the occurrence of febrile or inflammatory action, there is always a sensible interval of disease marked by evidences of diminished power in the arterial system, the oppressed and irregular actions of which evince its inadequacy to carry on the circulation with its wonted vigour. The pulse, if examined, will be found low, oppressed, irregular; which state passes progressively into one of permanently increased action or fever. Multiplied observations have satisfied us both that the stage of disease here mentioned precedes that of febrile action, and that the morbid actions indicated by the pulse succeed each other in the order here announced; the first being that of feebleness or overloaded power, the second of irregularity, and the third of permanently quickened circulation. It has been already stated how incipient plethora, when the redundancy is no longer disposed of by the healthy action of the several organs of appropriation, and when these can no longer perform steadily the increased labour, gives rise to the state of feebleness now under discussion. To comprehend the nature of these several changes is not difficult, it being readily explicable by reference to well-known laws of vital action.

When redundancy of nutritive matter first occurs, its immediate effect is to promote more vigorous circulation, and to excite to increased actions the several capillaries, especially those engaged in nutrient secretion. The peculiar stimulus of the nutritive matter excites these actions; their end is to dispose of the redundancy by natural appropriation, and the effect on the frame in the first instance is only that of increased volume and exuberant health. But to all vital actions, and the degree to which they can be continuously sustained, there is a limit; and when increased beyond this, they after a time become relaxed, sinking even below the natural standard. By incipient plethora increased actions are excited which at first differ from perfectly healthy actions only in degree. In time, however, and especially if the plethoric state be kept up by excessive nutriment, they become enfeebled and abate; then it is that the pulse, which antecedently was fuller and stronger than natural, first becomes low and oppressed. The disposal of redundancy by increased action of healthful processes proving inadequate, from inability of the vital powers to continue it, other efforts are now needed; and as these, though in their tendency corrective of what is amiss, no longer resemble the healthy actions, they must be considered as morbid; disease being the result of their institution. While we thus regard them, however, we should never lose sight of the corrective tendency which originally belongs to them, nor fail to profit by the curative indications which the efforts of nature point out. The minute changes so induced we pretend not wholly to explain, though many of them are readily intelligible; but the cognizable phenomena are sufficiently obvious to mark their connection and dependency, and thus to establish a rational theory of the course which nature pursues.

Relief by increased nutrient secretion not sufficing, a more general excitement seems now required, the object of which may be to call into more vigorous exercise the several excretories; and a state of generally increased or febrile action ensues. The state of irregularity is obviously the transition from the state of feebleness to that of permanently increased action or fever; and the end of the latter is to get rid of the original cause of disturbance. It is in proof of the correctness of these views that if in the stage of feebleness depletion and abstinence be resorted to, the feebleness disappears, natural vigour is renewed, and health is restored, without any febrile action being instituted; while if this state be treated with stimulants and nutritive diet, febrile or inflammatory action is sure to result. We wish here to observe that in these remarks we use the term *fever* to denote, not any of the specific diseases known by that name, but simple pyrexia, characterized by a quick pulse, hot skin, and furred tongue, being the constitutional state attendant on the ordinary phlegmasiæ, and so generally, through a radical misconception, denominated symptomatic fever. As the stage of feebleness is relievable by evacuations and abstinence, so are those of irregular action and of febrile excitement to be remedied by the same means; and if these be duly employed, any or all of these morbid conditions may be promptly corrected without specific disease or local lesion of any kind ensuing. But if they be not employed, and more especially if, through misconception, stimulants be used and nutritive diet continued, then febrile action becomes more determinately aroused, and some specific disease of an inflammatory character is engendered; or else, if the constitution be, from natural inertness or the extent of labour to be performed, unequal to the effort necessary for generating a state of fever in inflammation, the general health progressively declines, the powers of life become enfeebled, and the constitution finally sinks under some of the complicated forms of chronic disease. When, under the former of these results, active fever or inflammation occurs, it is in general speedily subjected to medical treatment; and as opinions vary but little respecting the measures to be pursued under such circumstances, while the urgency of disease requires them to be employed with proportionate vigour, it seldom happens that this stage of disease is improperly treated, at least so far as regards the use of evacuants. At this time the propriety and necessity of active treatment and of depletory practice are admitted on all sides; yet previously to the acute attack a deviation from a healthy state existed, which admitted of detection, and which as clearly indicated the propriety of some depletion, though it might not demand it so imperatively, nor require it to the same extent, as when the acute attack had supervened. Were this introductory stage relieved by adequate depletion and other suitable means, there can be little doubt that the accession of acute disease might

in every instance be averted, or at least so greatly mitigated as to be free from all danger.

It appears from all that has been stated, that incipient plethora in a healthy constitution excites at first only increased energies of healthy functions, manifested in the increased bulk and more florid aspect which such persons usually present, and in the evidences of more vigorous circulation which the pulse affords; that this state of increased healthy action, if urged too far, declines into one of diminished power, still evinced by the pulse, which then becomes low, oppressed, and irregular; and that, if these progressive changes be overlooked or unrelieved, a state of permanent excitement succeeds, such as constitutes fever or inflammation. It is obvious, then, that the increase of bulk and more florid aspect in which so many exult as evincing sound health, and which they endeavour by all the aids of good living to promote, is not a source of unmixed congratulation; but that, on the contrary, it deserves to be regarded with no slight suspicion, as actually verging on consequences by which both health and life may be forfeited. Up to this period, however, disease cannot be said to have commenced, however it may be approached; and reduction of diet, with free bowels and increase of active exercise, would suffice for getting back to sounder health without any need of medical interference. When abatement of healthful energies becomes evinced by a low and oppressed pulse, diseased actions may be said to commence, and when the stage of irregular action ensues, sensible progress may be considered as made towards the establishment of febrile action and inflammatory disease. When these latter result, medical aid and active discipline are indispensable; but up to this period much may be done by mere reduction of diet and a free state of bowels to avert the pending mischief. This condition of the body will be further illustrated, when the practical treatment required for its relief comes under discussion, the course of inquiry rendering it necessary to proceed now to the consideration of the second division of the subject, or that of relative plethora.

[An examination of the relative proportion of the constituents of the blood in plethora has shown to M. Andral, (*Hématologie Pathologique*, p. 41, Paris, 1843; or Amer. edit. by Drs. J. F. Meigs and A. Stillé, Philad. 1844,) that it differs from ordinary blood in the greater quantity of globules, and the much smaller proportion of water. In 31 specimens of blood, taken from plethoric patients, he found the mean quantity of globules to be 141; the minimum 131; and the maximum 154. His researches have led him to the conclusion, that the grand condition of the blood, which favours the production of hemorrhage, is a diminution of the fibrin as compared with the red globules. In plethora, the proportion of globules is greater than in the healthy state, whilst that of the fibrin may be normal, or below the physiological condition. When hemorrhage occurs under such circumstances, the quantity of globules diminishes, but not that of the fibrin; hence, an equilibrium is induced, and the hemorrhage may not recur, or not until an excess of globules is again produced. In scorbutic cachexia, as shown elsewhere, the quantity of fibrin is diminished, whilst that of the globules may have remained stationary. In the 31 cases, above referred to, the mean of the fibrin was 2.7;—less than the average of health; thus showing a marked difference between the condition of the blood in plethora and in inflammation.]

II. In relative plethora the earlier deviations from a healthy state take place so gradually, and the constitutional efforts are so feebly exerted, that for a long time they are nearly unnoticed. Health is observed to be less perfect; there is occasional languor and disinclination to the customary exertions, with irregular distribution of blood as marked by coldness of feet and variable countenance; the bowels are irregular, the appetite is capricious or fails, and both flesh and strength decline.

At the earlier periods of this state the pulse will be found weak, often irregular. Sooner or later a febrile or inflammatory state ensues, marked by a quickened circulation, some increase of temperature, and a white or furred tongue. This state may continue for an indefinite period, and be subject to frequent fluctuations; most frequently in course of time some part more particularly suffers, a local ailment arises which excites attention, and to which, when discovered, the constitutional indisposition is most commonly ascribed. In order to judge correctly of this condition of plethora, it is necessary to mark particularly the accordance of its phenomena with those which absolute plethora presents, especially in the changes which the pulse undergoes. This, here also, is at first feeble and oppressed, then irregular, and finally it becomes permanently quickened.

As the incipient lowness of the pulse is the symptom which so generally misleads, conveying the impression of debility, and suggesting the employment of tonic and stimulant remedies, it is highly necessary to distinguish it from a pulse of pure debility. Happily there are other circumstances besides the pulse to direct the judgment in this respect; other obvious derangements coexist, displaying a harmony of symptoms, which, taken collectively, establish beyond a doubt the existing condition of the vascular system. But the language which they speak is not always understood; their warning voice is unheeded; and the deceptive lowness of pulse is suffered to counteract the evidences which the other coexisting symptoms display. On this account it is that we dwell so much on an accurate discrimination of the indications which the pulse affords; not so much for the positive evidences which it furnishes —for there are others much less equivocal, and far more worthy of being relied on—as that, when this peculiar lowness exists, it shall not be suffered to bias the judgment or to divert the practitioner from those measures by which alone the morbid condition referred to can be corrected. A little accuracy in the mode of examination, with attention to the impressions made on the finger, will readily detect the peculiarities which we have stated; and when familiarised to the touch by habitual perception, there can be little difficulty in distinguishing them. In the condition of which we are treating, if firm pressure be made on the artery, it will be found to resist beyond what its

apparent feebleness would indicate, and, on gradually withdrawing the finger, to rebound with a force much greater than would at first be imagined. If the pressure and relaxation be a few times alternated, the sensation will be rendered more distinct. This inherent firmness is sufficiently indicative of the condition existing, and affords the best assurance of depletion being well borne. As we before stated however, and as will be hereafter more distinctly pointed out, there are other evidences to confirm what the pulse proclaims.

The state of irregularity of the pulse also requires precision in determining both its character and extent. It may be perceived as affecting both the force and frequency of the pulsations; and the irregularity of force, or that in which the artery makes a few strong pulsations, as if by a transient effort, and again relapses into a state of oppressed and diminished action, indicates, so far as we have been able to discover, a nearer approach to febrile or inflammatory excitement than the irregularity of frequency only; repeated observation of which fact has led us to infer that this stage of irregularity is the connecting link between the stages of feebleness and of permanently increased action, and that it consists of the early but yet imperfect efforts of the vascular system to form this latter stage; for when the febrile or inflammatory action is fully formed, the irregularity is no longer perceived.

The decline of power incident to a plethoric state of circulation has not been overlooked by theoretic or practical writers, however they may have failed to mark the order of succession which the phenomena present in the initiatory stage of disease, or to have deduced from these conclusions capable of affording practical guidance. Dr. Gregory, who has faithfully represented the state of physiological and pathological science as they existed when he wrote, notices distinctly both the weakness of the circulating organs and the inordinate burden imposed on them by a state of plethora. "Multa mala à nimia plenitudine oriuntur. Homo nonnunquam fere opprimitur, hebes, languidus, debilis fit, neque ipsa quæ sanguinem movent organa ad tantum onus impellendum valent. Pulsus languet, et aliquando syncope, et vertigo, et palpitatio observantur. Sæpius vero vasa nimis distenta, ad motus præter solitum vehementes et abnormes proclivia fiunt." Here the facts are explicitly stated, but the connection of the state of debility with that of increased action is not traced, while symptoms, which belong to more advanced periods of disease, and arise from ulterior derangements, are intermixed, creating confusion. And, further, the stage of permanent excitement is regarded rather as the result of over-distension of vessels, than of the stimulus of redundant nutritive matter over-exciting the vital powers.

As the succession of these several stages may be observed taking place naturally, so may the changes be accelerated and displayed by means of medical treatment; for if the constitution be long oppressed, and have long endured the stages of feebleness and irregularity, moderate depletion has the effect of relieving the vital powers, so as to bring on the period of increased action much sooner than it would otherwise occur. This effect is strikingly exemplified by Dr. Watt in his valuable treatise on diabetes; in which he has shown that the pulse may be raised from the extreme of depression to vigorous action by free bloodletting, and that under this process the blood itself becomes changed from a dark grumous mass, scarcely coagulating, to the blood of active inflammation, with firm coagulum and thick buff. Changes similar to those recorded by Dr. Watt we have had repeated occasion to witness both in diabetes and in cases where no urinary affection existed; and for many years we have been accustomed to refer them to the pathological state of the vascular system which we are now endeavouring to explain. This state also will require further illustration when its practical treatment comes to be considered; but ere we pursue the subject of nutritive plethora further, it is necessary to notice the vitiation to which the blood is liable from its becoming overcharged with the excrementitious matter carried back to it by the absorbents, which in the ordinary course of health ought to be regularly expelled, but which, under impaired energies or interrupted functions of the excretory organs, accumulates in the blood, oftentimes to a considerable extent, vitiating its quality, unfitting it for healthful nutrition, and oppressing and debilitating all the powers of life. The necessity for noticing this state arises from its being continually combined in various proportions with the condition of relative plethora, the progress of which it sensibly impedes, and the phenomena of which it complicates and obscures.

III. In the morbid condition which we are now to notice, the deviation from health takes place still more gradually than in relative plethora. Indeed, so insidious is its advance, that, not producing any immediate or special disease, and marked only by change of aspect and some abatement of wonted powers, it is for the most part overlooked, or at least undergoes no adequate investigation. Combined as it is, too, with relative plethora in every proportion, and by its debilitating effects even ministering to this latter, it becomes confounded with derangements of a character essentially different, and the influence which it exerts both in generating and modifying disease, fails to be recognised. It arises from defective excretion; and as exercise is the natural stimulant for exciting the various excretions to an adequate performance of their functions, this condition more peculiarly occurs in the sedentary and the indolent. It is characterized by great sallowness of aspect and duskiness of skin; the pulse is low and compressible; the surface of the body is in general harsh, dry, and deficient in natural transpiration; the tongue is for the most part moist and clean; the appetite capricious, often voracious; the alvine evacuations are inveterately foul, exhibiting no traces of healthy secretion; the urine is high-coloured, depositing a dark sediment, and often very fetid; even the perspiration has frequently an offensive odour, and gives a dusky tinge to the linen which absorbs it. The state here described has not escaped observation, having been noticed by medical writers, and even ascribed by them to the causes here assigned. Ramazzini more than a century ago represented distinctly this condition of body, as induced in

certain artificers by sedentary habits and inactive life, explicitly referring the sallowness of aspect and depraved health, together with certain defœdations of the skin, to the *excrementitious* matter of the body being imperfectly discharged. In his work, "De Morbis Artificum," ch. xxx. he remarks, "Scabiosi quoque decolores, ac mali habitus esse solent sedentarii artifices, sarcinatores potissimum, ac mulieres quæ suis in laribus die ac nocte, ut victum sibi quæritent, acu operantur, hæ enim mala inexercitatos comitantur; nam vitium capit sanguis ni moveatur corpus, *unde illius excrementa in cute restitant, et universus corporis habitus vitiatur.*" Again he states, "Mala igatur intemperie et multa vitiosorum succorum redundantia laborare solent hujus modi artifices, ob vitam sellulariam quam degunt, ac præsertim sutores. Non sic tamen multi alii artifices qui sedendo operantur, uti figuli, textores, qui brachia et pedes, totumque corpus exercent ac propterea saniores sunt, ut *quibus sanguinis impuritates facilius per hujusmodi motum discutiantur.*" Here are represented as distinctly as words can convey, both the accumulation of excrementitious matter resulting from inactivity and defective excretion, and the depravation of habit to which such redundancy gives rise.

The manifestations now noticed as belonging to excrementitious redundancy are intermixed in every proportion with those of relative plethora, the two conditions mutually reacting on each other. Arising, however, as they do from totally different sources, it is highly necessary to discriminate them so as to impute to each what belongs to it, and thus render the practical treatment more definite and precise. No symptom marks the existence of excrementitious excess in the blood more signally than the obstinate foulness of bowels so often encountered in various maladies, and which no employment of purgatives seems to correct. If by their use such relief be given to the system as empowers it to make a febrile or inflammatory effort for impelling blood into the capillaries, renewing more active processes of secretion, and thus ministering to its own relief; if the pulse become quicker and firmer, the tongue white and loaded, with such evidences of increased activity of circulation as to warrant the use of small bleedings, these, if employed with sound discretion, and adapted to the powers of the constitution, will, in conjunction with the excited powers with which they are used to co-operate, do more to correct the morbid condition of the bowels, and thus restore healthy evacuations, than any use of purgatives however judiciously managed or perseveringly employed. This fact we have so often witnessed, that when this state of bowels is found to resist purgative treatment, we have for many years been accustomed to resort to the moderate use of the lancet, as the most effectual auxiliary of purgatives that can be employed. Bloodletting, however, in this morbid condition of the system, requires much caution and a clear conception of the principles on which its employment is founded, to guide its use; for if resorted to at too early a period, while the powers of life are still torpid and inert, or if pushed even a little beyond what those powers can bear, much mischief and formidable exhaustion may result. Some tendency to renewed excitement ought perhaps to be manifested ere the lancet be used; but when this presents, then small bleedings will contribute to rally the dormant powers far more effectually than the most potent tonics.

In the transition here noticed of the sluggishness of system belonging to a state of excrementitious redundancy, into the excited power manifested by febrile action, it cannot fail to be observed how closely the latter corresponds with what has already been described as occurring in relative plethora. In fact, so far as the state of excitement is concerned, the conditions are identical, displaying the same pathological phenomena, and ministering to the same end, the only difference being the modification which any great degree of excrementitious accumulation produces in the actions and symptoms; which after all is a difference more in degree than in kind; for when relative plethora has existed for any time, excrementitious accumulation is sure to become combined, it being the direct product of the debility and imperfect excretion incident to this morbid condition.

The consideration of excrementitious redundancy might with propriety have been included in that of relative plethora, were it not that the separate notice of it renders its nature and phenomena more clear and explicit. For practical purposes, however, the two states cannot in our conceptions of them be disunited, for relative plethora gives rise to excrementitious redundancy; and when any high degree of the latter primarily occurs, it is most probably incapable of correction without the intervention of those sanative efforts which the constitution itself makes when aroused into febrile excitement. To promote these efforts, not merely by exciting enfeebled powers with stimulants, as is too much practised, but by diminishing their labour, and thus rendering them more adequate to its performance, through the cautious abstraction of blood, and the establishment of more efficient excretions, is the process by which the objects of the medical practitioner will, in numberless instances, be best attained. To pursue this course, however, requires unbending integrity on the part of the practitioner, and firm confidence on that of the patient. It is opposed by many prejudices; it works not like a charm, and extravagant expectations of instantaneous results would not be realized. Time is required for its success; it is nature that effects the cure, and her operations are not to be hurried. They, however, who are willing to abide by her slow but sure exertions, and who value the re-establishment of perfect health more than the temporary alleviation of some partial ill, will be amply repaid in the fulfilment of their more rational desire, so far as it is attainable by human means; and we can confidently say, from the experience of a life which has for above thirty years been devoted to medical science and practice, that the satisfaction which we have derived from witnessing the renovation of health and strength thus effected, has surpassed even that which the signal relief of acute disease by active treatment, and the consequent saving of life, has ever afforded.

Treatment. — We proceed now to consider the practical treatment of the three several conditions to which we have directed attention, namely,

absolute plethora, relative plethora, and excrementitious redundancy.

1. *Absolute plethora.*—In this condition, including the diseases to which it gives rise, we may tracc three progressive stages. The first embraces the period which precedes febrile or inflammatory excitement; in the second, febrile excitement exists unaccompanied by any prominent local affection; and in the third is superadded some local inflammation, or other partial derangement, constituting what is usually deemed a specific disease. When the latter arises, it no doubt reacts on the constitution, aggravating the several disturbances in proportion to the importance and the degree of derangement of the organ or function specially affected. But if the series of morbid actions here represented be that which nature follows, it is clear that they are much in error who ascribe what is miscalled sympathetic fever to the local disease coexisting, which, instead of exciting the attendant fever, is only its direct product.

The phenomena which mark the incipient stage have been already noticed and explained; and it was stated generally that the proper treatment for correcting this morbid condition consisted essentially of depletion to remove the plethora, and abstincnce to prevent its recurrence. And this treatment, if timely employcd, would always suffice. Indeed, in the very early periods, abstinence alone would, by cutting off the supply of inordinate nutriment, give effectual though slower relief. But were this otherwise, inasmuch as they who become so affected are still considered as enjoying perfect health, it would be useless to lay down rules of treatmcnt to which none would be likely to resort or conform. Indeed, we should be reluctant to lay stress on this initiatory stage, if doing so were to induce any suspicion of a wish to bring under medical discipline those who probably exult in their not requiring its unenviable interference. Even if it werc in our power, therefore, to arouse every such individual to a full sense of his approximation to disease, and of the dangers to which this exposes him, we should hesitate to give rise to such incalculable misery as a perpetual watchfulness over the feelings of health could not fail to occasion; for though many might, by timely precaution, avert diseases that would otherwise ensue, the constant anxiety to which numbers would be unnecessarily consigned by the prevalencc of such impressions, however correct, would greatly counterbalance any good that could result. It is of consequence, however, that medical men should have a just conception of this state when subjected to their obscrvation, so as not to be misled by delusive appearances; and it is of the highest importance, whcn, as continually happens, acute and dangcrous maladies have a tendency to return, to be aware of the premonitory signs that mark an approaching accession, so as to employ in time the means necessary for averting its recurrence. To precautions of this kind, as formerly mentioncd, the writer was indebted many years ago for his own preservation and re-establishment of health; since which period he has had ample opportunity of proving, by extensive application of the principles now inculcated, the value and efficacy of such timely prevention.

When the stage of disease now under consideration is subjected to medical treatment, the means of relieving it are simple in the extreme, consisting only of moderate bloodletting, occasional purging, and reduced diet, with a speedy return to such exercisc as may be required for keeping the several secretory and excretory organs in the adequate and healthful discharge of their functions. By these means, pursued without any sensible impression on the general strength, and scarcely an interruption of ordinary avocations, may this condition be effectually relieved, and the dangers to which it leads successfully averted. It may conduce to accuracy of conception to explain here what is meant by *moderate bloodletting*. The object is to remove a certain portion of the circulating fluid in order to diminish the proportion which the nutrient matter bears to the watery solvent. This latter is so readily absorbed and carried into the circulation, that the actual volume of the blood becomes speedily restored. For the relief of incipient plethora it will in general suffice to abstract twelve or sixteen ounces of blood at a time, the evacuation being repeated as circumstances may require, both the amount and the repetitions being dependent on the individual constitution. In the case of the writer, when suffering under this stage of plethora, much larger depletion was required; above thirty ounces being often taken from the arm without the evacuation being otherwise felt than in the relief which it afforded. If the necessary relief happencd to be postponed, so as to approach the period of active fever, the bloodletting required to be of still larger amount. At such time there was gcnerally some uneasy sensation, caused by certain local determinations of blood to which the writer was subject; and when this existed, blood was usually suffered to flow without regard to quantity, until the uneasiness subsided. If the evacuation stopped short of this effect, the relief was incomplete, and a speedy repetition of venesection was sure to be required, and to a greater amount. From this free use of the lancet, guided as it was by a definitc purpose, and bounded by certain limits, though these were not measured by quantity, the writer never in any instance suffered injury such as is so often ascribed to large bleedings, and he is quite satisfied that by observing the rule which has been stated, more effectual relief was obtained, and that morbid actions were restrained with less ultimate loss of blood, and less prostration of general powers, than if blood had in the first instance been sparingly taken.

The principle of carrying bloodletting to the extent of making some impression on the constitution, and thus arresting the progress of morbid action, we shall have to consider more fully when we come to treat of its employment in active inflammation. We may here, however, cursorily remark, that when morbid actions of an inflammatory kind prevail to such extent as to demand direct depletion by bloodletting, effectual relief is not afforded unless the sufficiency of the depletion is manifested by some impression on the vital powers; for under high and active inflammation, twenty, thirty, forty, ounces or more, may be abstracted without making any impression, when the

loss of a few ounces more will, by inducing a disposition to syncope, at length arrest completely the inflammatory action, and repress the violence of disease. In such case, if the depletion be regulated by regard to the quantity of the blood taken rather than the effects resulting; and if from vague apprehension of injury it stop short of that relief which ought alone to set limits to it, the morbid action is left unsubdued, and much greater loss of blood is required eventually to allay it; and this with considerable risk of its then failing to accomplish its end; for independently of the hazard of allowing inflammation to continue in any organ essential to life, it should ever be borne in mind that in proportion to the time during which morbid action of this kind is suffered to continue unrestrained, will be the difficulty of finally subduing it; and consequently, that whenever active inflammation arises, it can never be too soon nor too effectually arrested.

From ample experience of the correctness of these views, we have long been convinced that when active inflammation occurs in a robust and vigorous frame, copious depletion in the earlier stages is the surest means of saving animal power and of accelerating perfect recovery. In the initiatory stage of plethora, however, such active measures are not needed. The object here is to reduce the quantity of blood as the most direct means of altering its quality; there is no inordinate action to subdue; and however moderate the depletion, it must give relief proportionate to its extent, the ground gained being afterwards maintained by other evacuations and abstinence. But when, from continued or increasing plethora, the second stage, or that of febrile action ensues, then the principle which we have noticed becomes directly applicable. When the oppressed pulse passes into a state of irregularity, and thence into one of permanently excited action, as manifested by a quickened circulation, hot skin, and white tongue, active depletion becomes necessary, and it requires to be regulated on the principle now stated. At this time, too, other auxiliary remedies are needed. Of these purging is the most direct and most powerful, and saline purges, which produce copious watery discharges from the bowels, are among the most effectual. Several neutral salts and antimonial preparations are also valuable, as co-operating in the general purpose by the increased secretions to which they incite the kidneys and skin; and by the judicious administration of these several remedies in conjunction with low diet, may this second stage in general be promptly and effectually relieved. The mode of exhibiting these remedies is so familiarly known and so continually practised in the treatment of the several phlegmasiæ, which so much prevail, that it would be superfluous here to enter into further details.

When local inflammation becomes superadded to the febrile excitement, we have then to consider not only the general plethora and febrile condition of the system, but also the state of the organ or part locally affected. If it be an organ essential to life, then the utmost activity of practice is required to guard against the danger arising from its functions being suspended or impeded, and from the disorganization of structure which continued inflammation is sure to induce.

It would exceed our province to notice here every local inflammation with which a predisposed body is liable to be assailed. For the purpose of illustration, therefore, we shall confine our remarks to two of the more urgent, and, by particularizing the treatment which they require, exhibit the principles of practice so clearly as to render them easily applicable to every corresponding case that can occur. With this intent we shall select two organs of primary importance, the brain and the lungs. When active inflammation of either organ is manifested by its appropriate symptoms, the necessary treatment must be promptly and vigorously applied, for the danger arising from suspended or impeded function is considerable, and both the obstinacy and danger are enhanced in proportion to the delay of the necessary depletion, and the insufficiency of its early employment. If bloodletting be not early and vigorously employed, such derangement of structure may quickly ensue as to destroy life, or permanently unfit the organ for the discharge of its ordinary functions. The effect of bloodletting in this case is twofold; by the quantity of blood abstracted it diminishes plethora, and by its influence on the moving powers it moderates or subdues the arterial actions by which inflammation is upheld. As inflammatory action in such cases cannot be too soon arrested, and as suddenness of depletion greatly promotes its speedy effect on the moving powers, the blood should be taken from a large orifice, in a full stream, and with the body erect. To be effectual, the depletion should be carried to the extent of making sensible impressions on the local symptoms of either head or chest, and this will be found to coincide almost uniformly with abated action of the artery as felt at the wrist. When under the flow of blood the pulse falters, the lips become pale, and the face bedewed with perspiration, bloodletting may be confidently relied on for yielding all the relief which this truly potent remedy is capable of affording. The quantity necessary to produce this effect varies greatly. The writer has himself lost from forty to fifty ounces at one bleeding, and has nevertheless required a repetition to smaller amount within a few hours. We have known much larger bleedings employed in urgent disease with only salutary effect and without a single bad consequence resulting. As cases of extreme violence are those in which inadequate depletion would prove most fatal, it is necessary to notice the amount to which bloodletting may under urgent necessity be safely carried. Happily such cases are not the most frequent, and in the more moderate instances which most prevail, evacuations much more moderate will suffice. When by one or two bleedings, so conducted as to make impression on the moving powers, the more urgent symptoms are alleviated, the repetitions may then be regulated so as to keep within the bounds of all possible risk of excess.

If the plethora be considerable and the fever continue high, it may still, even though the local symptoms have yielded, be requisite to take more blood, so as to bring back the circulation to a

healthy standard, and subdue remaining excitement, or relapse of inflammation may occur. By such means, combined with the auxiliary remedies already noticed, and assisted by the topical treatment suited to each local disease, a state of the most imminent danger may be speedily changed to one of perfect safety, provided organic lesion has not yet taken place.

The practice here inculcated may possibly appear to some bold and hazardous, but we can confidently appeal to the experience of those whose opportunities of treating active inflammation have been greatest, for the soundness of the principles which we advance, and for the perfect safety of the measures enjoined. We willingly admit that the ordinary course of medical practice may be carried on by less active treatment, for a large proportion of ordinary cases requires no more; but when urgent disease occurs, the attempt to dispense with proportionate activity of treatment can lead only to fatal results or tediously protracted disease. We have purposely dwelt on the severe rather than on the milder instances, in order to show more clearly and forcibly what the principles are on which the treatment should be conducted. As the symptoms of each case, and the constitution to be acted on, denote the activity required, and thus guide the practitioner in the use of his remedies, there can be little hazard of the representations here made misleading any one into a rash or excessive use of bloodletting.

It may not be amiss here to take notice of two consequences, either of which may attend a very full bloodletting, namely, syncope and convulsion. They are prone to occur when much blood is taken, and especially when the patient is bled in an erect posture. There seems little room to doubt that both arise from the vessels of the brain being too much emptied, the enfeebled action of the heart being insufficient to refill them; and, as is familiarly known, recumbency of the body, which allows the blood to return to the brain with less of the heart's impulse, is the direct, and, we may add, uniformly effectual remedy. It has happened that patients bled to syncope have not revived; but this has been of rare occurrence, and when it has taken place, we should strongly suspect that blood must have been drawn beyond all prudent bounds, or that the propriety of taking any blood was questionable. We have witnessed many instances both of syncope and of convulsion, and can truly affirm that we never saw a single case in which injury of any kind resulted. We are no advocates, however, for bleeding syncope, and never direct it, although, if urgent disease were to be arrested, we would go to the verge of it, for the reasons already assigned. Convulsion is an effect more formidable in appearance than syncope; and yet, though we have frequently seen it so induced, we have never known harm attend it. In its effect of lowering arterial action, we regard it as perfectly analogous to syncope, and for all that we have seen, equally innocuous. Yet, as it is always alarming to the bystanders, and as neither it nor syncope is necessary to ensure the full effect of bloodletting in subduing inflammation, we would willingly avoid both. There is a caution which we here wish to suggest to those who may have occasion to draw blood largely, namely, never to leave a patient so depleted until placed in a recumbent posture. The following case, of recent occurrence, will illustrate what we mean. We were requested to visit a man who had been seized with apoplexy some hours before. We found that he had been promptly bled, and to a large amount. The quantity of blood which we saw could not be under seventy ounces; it was thickly buffed in the earlier drawn portions, and we saw no reason to doubt the propriety of its abstraction. Having bled the patient, the medical attendant, pressed by other engagements, went away directing him to be placed in bed as soon as possible. Circumstances prevented this being done, and when we arrived he was still sitting in the chair in which he was bled, held there by four stout men, whose united efforts were required to restrain the horrible convulsions which recurred every quarter of an hour or twenty minutes: he had been in that state for nearly two hours! His countenance was ghastly, the eyes glassy, lips livid, and breathing irregularly laborious. We had him instantly laid on the ground, and as speedily as possible transferred to bed; nothing more was required, for circulation soon returned, the pulse again became distinct, the countenance calm, with returning colour to the lips, and the breathing tranquil. This was an extreme case, being by far the worst we had ever witnessed. The bloodletting was unusually large, and severe convulsions continued at intervals for nearly two hours, owing to the imprudent continuance of the erect posture. Yet so little injury did this man suffer, that in less than ten days he walked to his physician's house, free from complaint, to thank him for having visited him.

It should be recollected that in the practical remarks hitherto offered, we have had in view inflammatory complaints only as they occur in absolute plethora, consequently in their most active and violent degree. In this state they require large depletion, and there is always ample power to sustain it, the danger being that of falling short of the quantity necessary rather than of exceeding it. Diseases of the same species, however, occur in every condition of the system, and according as they take place in feebler constitutions, and are marked by less violence of symptoms, may measures of less energy be trusted to for their relief. It is from not noticing the difference of constitution or the degree of general plethora present under attacks of local inflammation, that so much diversity of opinion has prevailed among medical practitioners respecting the extent of depletion required. From peculiarities of local districts, some practitioners never encounter diseases of this violence. They accordingly find that copious depletion may be dispensed with; that if employed, it sinks the powers of life, and lessens the chances of recovery, and thence they somewhat hastily conclude that the active treatment pursued by others is rash and unnecessary. Diseases of this languid character may be supposed to prevail most in large and crowded cities, where the habits of life are sedentary and luxurious, and where inflammatory complaints are connected more with relative plethora than with absolute. Perhaps London may be taken as the best exemplification

of this remark; and it is very generally believed that there the corresponding diseases do not bear the activity of treatment which the provincial practitioners find indispensable. We have it asserted, however, from high authority, that this is a misconception, and that no such difference exists, at least to the degree represented; for that London citizens both require bleeding as freely and bear it as well as the residents of any other district. The subject, however, will come more appropriately into the next section.

2. *Relative plethora.*—This variety being of more frequent occurrence than absolute plethora, and having connected with it a greater number of diseases, the consideration of it is still more important, and entitled to closer attention. In it, too, the progress of morbid action is more gradual, and the constitutional efforts to rectify existing derangements are more varied and more general. Hence the character of the disease produced by or incidental to this condition is complicated, and their elucidation proportionally difficult.

The earlier phenomena being less conspicuous, attract less attention, and the equivocal character which they frequently present being liable to misconception, it becomes important to illustrate clearly the real nature of this condition, to exhibit distinctly the phenomena which characterize it, and to point out accurately the practical treatment suited to its relief, in order to prevent the highly injurious practical errors, to which misconception in this respect so continually gives rise.

In relative plethora, as in absolute, the earliest deviation from health is marked by evidences of diminished power in the general circulation. The pulse becomes low and oppressed, and the general powers enfeebled. When, from natural feebleness of constitution, or the absence of excitement, this incipient stage is prolonged for any considerable time, the impaired energies and deficient exercise of the several excretory functions give rise to more or less of excrementitious accumulation, and a combination of these opposite conditions results. More frequently, however, this stage passes into that of increased action, and some congestion, inflammation, or other local malady becomes manifested. A hard and frequent pulse, increased heat of skin, and whiteness of tongue, mark the formation of the second stage; and if in moderate degree, and unexasperated by stimulants, this may, in constitutions not predisposed to any particular malady or local lesion, continue for months or even years without any specific disease ensuing, and with only progressive deterioration of general health. We have so often met with this state clearly characterized, that we have been in the habit of distinguishing it by the term *constitutional inflammation*, meaning thereby to designate general inflammatory action in the system, unattended by local inflammation.

All the phenomena which belong to this stage are of an inflammatory character. Blood drawn frequently exhibits a thick, buffy coat, with cupped and with contracted edges, and the treatment of inflammation is that which alone affords effectual relief. If taken at an early period, moderate depletion and antiphlogistic regimen will speedily correct it; but if neglected or improperly treated by tonics and stimulants for any length of time, it becomes more difficult to remove, acquiring obstinacy from its continuance, and through the congestions and local determinations which are prone to occur during its progress, laying the foundation of various specific diseases of the worst kind. The treatment of the several stages requires to be discussed at some length, and copiously illustrated.

Absolute plethora in its simplest form and earliest stage may be relieved by artificial means, without any excitement of the system being necessary to co-operate in the restoration of health. This the writer has unequivocally experienced in his own person, and he has thus been enabled to satisfy himself of a fact which is not often subjected to medical observation. In relative plethora it is questionable whether the capillary congestions, and other derangements of minute structure and function attendant on this condition, be removable without some sensible effort of the constitution, and whether febrile excitement, in some degree, be not a necessary agent in effecting a recovery. That it is often contributory to this end, we entertain no doubt. These observations have direct relation to the practice suited to the several stages. Should the earlier of these, in consequence of the decline of health to which its long continuance gives rise, come under medical cognizance, sparing depletion to lessen the redundancy, with moderate excitement to arouse the energies of the system, will be the most judicious and suitable treatment. Under extreme feebleness of pulse and great muscular debility, it may be prudent to commence with gentle excitement, watching carefully the time when increased action in the pulse manifests that renewed energy which will both justify and bear direct repletion. We are certain, from much observation, that when the pulse becomes irregular, blood may be taken, not only with safety but advantage, and that the relief afforded will be speedily manifested by the increased fulness and tone which the pulse acquires. For this purpose the earlier bleedings should be small; from four to six ounces may suffice to commence with. The repetitions will of course depend on the effects, and it is a subject of interest inferior to none which pathology presents, to mark in the extreme cases of such condition how progressively, under repeated venesection, the pulse rises, and the buffy coat is displayed on the blood. Some striking instances of this we have recorded in another place. In an enfeebled and emaciated boy, labouring under diabetes, 209 ounces of blood were drawn in twelve successive bleedings, the blood becoming changed from a dark grumous coagulum of loose texture to the thickest and firmest buff; and the strength of the body increased from feebleness hardly admitting of an erect posture, to a degree of vigour which enabled him to hold the plough for several hours a day. It may afford a clearer conception of this condition, and show the ability which the body acquires through bloodletting of bearing copious depletion, to present here a tabular view of the successive venesections practised in this case, with their amount, intervals, and the character of the blood drawn:

No.	Date.	Amount.	Quality of blood.	Total amt. at each period.
1,	Nov. 6,	12 oz.		12 oz.
2,	" 7,	14 "		26 "
3,	" 9,	17 "		43 "
4,	" 11,	14 "		57 "
5,	" 15,	17 "	buffy,	74 "
6,	" 18,	20 "		94 "
7,	" 20,	20 "		114 "
8,	" 25,	18 "		132 "
9,	" 27,	18 "		150 "
10,	Dec. 13,	20 "		170 "
11,	" 20,	17 "		187 "
12,	" 29,	22 "	buffy,	209 "

In another case, of a weakly and delicate female, without any special disease or local ailment, save pains irregularly alternating in the head and chest, 106 ounces were taken at seven bleedings, with similar changes of blood, and as well-marked improvement of general strength. Such instances may be deemed conclusive of the fact that the state of constitution which we are endeavouring to illustrate has a real existence. In these cases, the early symptoms were those of seeming debility; yet if this had been such as is generally imagined, life must have been inevitably destroyed by the means employed. If, then, there are states of disease marked by considerable debility, in which the constitution not only bears depletion without sinking, but acquires very considerable accession of strength under copious evacuations, it surely must be of the first importance to medical science to scrutinize such conditions of the system, and acquire juster notions of its real nature than are generally entertained.

When, by the judicious combination of small bleedings and moderate excitement, assisted by other evacuations, the system is aroused to greater energy, and a state of febrile excitement ensues, the treatment of this must be conducted on principles with which all are familiar. When a hot skin, quick pulse, and furred tongue present, no practitioner is deceived, or fails to resort to proper remedies. Our great object is to direct attention to the earlier and more obscure stages, to show their connection with the febrile state, and to demonstrate the correspondence which prevails in the treatment which they respectively require. The earlier the advance of such disease can be detected, the less will the interposition of art be needed, and the more effectual will it prove, both in correcting the febrile state, and averting the local injuries which continued febrile action will always sooner or later induce. There are occasions when this vigilance in detecting the incipient deviations from health is of the very first importance; a signal instance of which we shall briefly notice, as illustrating what it is wished to impress, and as proving the soundness of the principles by the efficacy of the treatment which they dictated, perfect recovery having taken place under circumstances which seemed to augur a very different result. A young woman applied to the writer above three years ago, with ovarian tumour, accompanied with great inflammatory action, both local and constitutional. Active treatment was employed, and the progress of the disease arrested. Continued attention, however, was required to keep down inflammation, and both bleeding from the arm and cupping were in constant requisition. Auxiliary means were freely employed, but bloodletting was the remedy which gave most decisive relief. So sensible was she of the advantage, and so intelligent in noting the premonitory indications which marked the necessity of depletion, that she was accustomed to ask for the lancet or cupping-glass, specifying her reasons for thinking they were needed; and on these occasions she was invariably right. To detail minutely a case which was subject to medical discipline for so long a time, would be tedious and unsuited to our present purpose. It may suffice to say that the constitutional state tended throughout to inflammatory action, and that by the fluctuations of this the local disease was influenced. The tumour advanced so as to form a considerable prominence in the right hypogastrium. Cupping, leeching, blistering, were all employed, and eventually a caustic issue was established over it. So much relief was obtained, that she was occasionally discharged from the hospital, in order to recruit her general health. After a short absence, however, she was sure to return with renewed disease, both local and general. It being sufficiently manifest that the local excitement was always preceded by febrile action, the propriety of looking closely after the latter was apparent. If fever was not speedily arrested, the tumour became active and increased; when, by early bloodletting, febrile action was reduced, the tumour remained quiescent. Early bleeding was therefore the remedy most worthy of reliance, and it was resorted to accordingly, with due caution, but determined perseverance. And here we were happily assisted by one well-marked evidence of renewed plethora and approaching fever that never deceived us. Ere pain was felt in the seat of disease, or any of the ordinary indications of fever presented, a dark narrow dry stripe appeared on the centre of the tongue. If this were unheeded, it soon expanded at the tip, and spread slowly towards the edges. By a moderate bleeding, this was promptly removed, and its sure attendants, general fever and local pain, were averted. By steady perseverance in the treatment here noticed, all disease was eventually removed; and within these few days we have seen this person in perfect health, and without a vestige of tumour remaining. We have no hesitation in attributing the fortunate result to bloodletting, and also to this being regulated on the principles which it is the object of this essay to inculcate. We may add that it never required to be carried to the extent of making even a temporary injurious impression on the general powers of the constitution.

We have stated that the state of febrile excitement is preceded by certain changes in the pulse indicative of its approach, and also that we are not under the necessity of judging solely from this evidence, for that other derangements coexist, which evince a harmony of symptoms, and that the whole collectively furnish indisputable proof of the actual condition of the vascular system. On the peculiarities of pulse we are not anxious to dwell, further than to give a seasonable warning that they be not suffered to bias the judgment through fears of an unreal debility. In judging

of the approach of febrile excitement, we are accustomed to rely more on the state of the tongue than on that of the pulse. When the constitution is assuming a disposition to febrile excitement, ere this is announced by the pulse, still feeble and compressible, the tongue presents a peculiar whiteness strongly characteristic and expressive, being distinct from any apparent secretion, and obviously resulting from some defect of capillary circulation in the tongue itself. This whiteness we have often seen disappear under bloodletting ere the arm was tied up. To describe it more particularly would be useless; to be known it must be seen, and they who are accustomed to inspect inflammatory tongues will at once recognise the condition to which we allude. We know not a stronger or surer evidence of incipient febrile excitement than this appearance of the tongue presents, and when it exists we should consider some abstraction of blood both justifiable and necessary. It appears, then, that bloodletting is suited to each stage of relative plethora. In the stage of feebleness when long protracted, small evacuations of blood relieve the oppressed constitution, thus enabling it to form the stage of febrile excitement which seems so necessary an agent in correcting the several derangements of the system. When used for this purpose, the early depletions should never be large, from four to six ounces being oftentimes as much as can with propriety be taken. According as febrile excitement advances, more copious depletion will not only be borne but required. The object of the incipient bleedings is not to make that impression on the moving powers which is necessary for the abatement of inflammatory action, but merely to abstract a portion of the circulating fluid, and thus lessen the plethora by which the system is oppressed. The blood may therefore be taken from a small orifice and in a recumbent posture. According as the period of excitement approaches, the effect of depletion in hastening its advancement becomes more manifest; and indeed it is a matter of familiar observation to surgeons, that even while the blood yet flows from the vein, the arterial powers so sensibly increase that the tardy and sluggish stream, which at first only trickled down the arm, becomes converted into a full and vigorous jet, the blood being oftentimes propelled to a distance of several feet. When this degree of increased action is displayed, blood may be more freely taken, and antiphlogistic treatment more rigorously pursued.

During the advanced stage, the object of venesection is both to abstract blood and to moderate inflammatory action by the direct impression which this remedy makes on the arterial system. Wholly or suddenly to subdue this action is not here intended, unless there be also local inflammation of a hazardous kind. The abstraction of eight or ten ounces will often suffice; that of twelve, sixteen, or even twenty will very frequently be well borne.

When local inflammation is superadded, then the extent and frequency of bloodletting must depend on the urgency of symptoms present, the importance of the organ principally affected, and the danger of this sustaining injury such as would be either immediately fatal to life, or ultimately subversive of health and vigour. Though in this state of constitution bloodletting is the remedy most essential, and which most effectually arouses the sanative energies of the system, yet other means are required for co-operating in the general purpose, and for re-establishing the several functions of life in their healthful and efficient exercise.

Next in power to bloodletting as an evacuant is purging, and this requires to be employed with much discrimination, if the full benefits of it are to be obtained. The objects of it here are both to deplete the system, and to restore to healthful efficiency the excretory processes connected with the alimentary canal, which, in the early stages of relative plethora, are always inadequately performed. Simple as the process seems to be by which the bowels are evacuated, we scarcely know a term in medicine more vaguely employed than that of purging. It is continually used to express processes essentially different, and which require to be accurately distinguished from each other. By observing closely the effects of different purgatives and the nature of the discharges produced by them, we may perceive some well-marked differences in their modes of operation. Those of one class simply evacuate the feculent contents of the bowels; those of another excite the various exhalant arteries, producing watery stools; and those of a third stimulate the mucous follicles which so abundantly line the intestines, causing them to throw off the mucus which they so copiously secrete. When the bowels are merely inactive, their secretions healthy, and no constitutional disease present, the simple aperients of the first class suffice to obviate costiveness and prevent feculent accumulations. Medicines of the second class are indicated, when, besides unloading the intestines, it is expedient to abate arterial action, or allay fever by abstracting fluids from the system. Those of the third are required when mucus, inordinately secreted, accumulates so as to clog and obstruct the secretory vessels themselves, and also when this accumulated mucus, acting as a foreign body, becomes instrumental in exciting or aggravating disease. The particular medicines belonging to each class will readily present themselves to every practitioner, and need not here be specified; neither is it important to distinguish them by any very accurate arrangement. The same medicines will act differently on different habits and under different circumstances, and it is the effect, not the medicine producing it, that is the chief object of consideration. On the simple aperients we have little to remark; they form a most useful class of remedies, and may be combined with the second and third classes, so as to assist in producing every species of alvine discharge. The several aperient neutral salts are well known as the principal purgatives for producing watery stools. When increased discharges of mucous secretions are required, our chief reliance is on certain preparations of mercury and of antimony. The stomach, forming part of the alimentary canal, requires itself to be occasionally unloaded, which is effected by emetics. And here too we should distinguish between those emetics which simply discharge the floating contents of the stomach, and those which cause it to throw off increased mucous secretions. Even though

vomiting be not resorted to, the mucous secretions of the stomach may yet be expelled by combining with purgatives such preparations of antimony as have an emetic operation. Consistently with these views it would appear that the most perfect evacuation of the whole canal must be that procured by combining medicines of each class, and accordingly we find the purgatives in most general use so constituted. When full purging is required to allay fever or lessen arterial action, no practice is more common than to give at night a suitable dose of extract of colocynth or of aloes, which are simple aperients, combined with calomel and antimony, medicines that expel mucous secretions, and followed next morning by a saline purgative, which, while it accelerates the operation of the previous dose, produces also copious watery stools. When these latter are not required, but yet a state of disordered intestinal secretion is manifested, it is often expedient to correct this latter gradually, the nature and activity of the cathartic employed being suited to the particular design; and whether it consist of colocynth, calomel, and antimony, or of rhubarb, blue pill, and ipecacuan, the same principles govern its administration, and similar effects, differing only in degree, are produced. With these principles to guide the employment of purgative remedies, they may be so administered as to prove most powerful auxiliaries of bloodletting in the several stages of relative plethora. In the earlier stage, simple aperients, combined with mild doses of mercury and antimony, are the most suitable. According as the febrile stage succeeds, saline purges may be more freely employed; and when fever becomes active, or local inflammations arise, these are indispensable. In proportion as the mucous secretions are accumulated or depraved—and they become signally so whenever the earlier stage of relative plethora has been of long duration—then must those combinations be employed which most effectually deterge the loaded membrane, and restore the secreting vessels to their natural condition.

A consideration of the several changes that take place in the body under febrile excitement, and a more minute observation of the immediate effects produced by increased arterial action on the several secretory and excretory organs, will show the value and importance of purgatives in a still clearer point of view, and lead to a more discriminative employment of them.

A certain degree of arterial action being necessary to the healthy exercise of the secretory and excretory functions, it might be reasonably supposed that increase of such action would lead to a more energetic performance of these functions, and increased formation of what they respectively secrete, — a supposition which the evidence of facts amply confirms, one of the earliest effects occurring in a state of febrile excitement being an increased secretion of the natural mucus which lines the stomach and intestines. Of the existence of such superabundant mucus during inflammatory complaints, sufficient proof is afforded in the discharges brought off by appropriate evacuants, or occasionally by the natural efforts. With respect to the stomach, if the examination of its rejected contents be superficial, it may mislead, for the mucus, if of recent secretion, being clear and colourless, is not readily distinguished from the surrounding fluid. Its tenacity, however, furnishes a ready means of detecting and demonstrating it, for if a rod or wire of any kind be drawn through it and elevated, it will raise from the watery fluid, discharged by vomiting, the mucus diffused through it, and sufficiently display its dense and viscid nature. Similar secretions go forward at the same time through the whole intestinal canal, as evinced by the quantity of mucus which a dose of calomel, or of calomel and antimony, administered under these circumstances, expels. And to the power of these medicines in dislodging such secretions is owing much of the efficacy so long and so justly attributed to them in the cure of acute diseases. The increased secretions proceed immediately from the greater activity of the secerning vessels. These again derive their excitement from the greater abundance and more stimulant quality of the blood conveyed to them; and the effect of their increased action is to correct the stimulant property of the blood, by disposing of the nutritive constituents which render it unduly stimulant, and thus to allay indirectly their own inordinate actions. Hence the relief of the constitution by means of the improved quality of the blood may be fairly considered the final cause for which these secretions are increased, for which febrile excitement is generated. In this view we can perceive the importance of purgatives, not only as general evacuants, but also as specially promoting those curative efforts by which nature herself endeavours to throw off redundancies and minister to her own relief.

The want of sufficient attention being given to the peculiar effects produced by different purgatives may account for much of the uncertainty and indecision that have prevailed in the employment of them. This part of medical practice, indeed, has been much improved of late years; and the labours of several modern writers, of whom Dr. Hamilton and Mr. Abernethy are preeminently distinguished, have done much to assert for it the importance due to it. Still much remains to be investigated respecting it. If the mucous matter be recently formed, and in no great quantity, a common purgative will suffice to remove it, together with all such feculent lodgments as the bowels may contain. A source of injurious irritation is thus removed, the various secretory and excretory vessels are disencumbered of an oppressive load, and left free to perform their natural functions, or to renew their sanative efforts; and the process of nature instituted for the removal of redundancy and restoration of health goes uninterruptedly forward. If the mucous secretions be of older formation, consequently more viscid and tenacious and less easily expelled, the common purgatives fail to give relief, and a doubt is thus often cast on the propriety of employing purgative treatment. The patients may be misled, as many continually are, by false experience; but the practitioner should not fall into this error. The fault lies not in employing purgatives, but in not suiting those given to the effect required; for if a suitable preparation of mercury or antimony be in such case combined with the simple aperient, the result will rarely occasion

disappointment. If saline purgatives be given with the intention of cleansing the intestines at a time when they are coated with viscid secretions, the purpose will be very imperfectly answered, while if persevered in when general evacuation is no longer needed, and there is no febrile action to call for their use, they fruitlessly exhaust strength and do sensible injury. Even the powerful remedy which a combination of calomel, antimony, and drastic purgatives supplies, may be misapplied, and if rashly given when the bowels are irritable, with little mucus present, distress and injury may result, and an useful remedy thus fall into unmerited disrepute. In fine, by neglecting to ascertain the precise nature of the evacuation required, and to apply with accuracy the remedy suited to effect it, we must ever run considerable risk of disappointment in the effects expected from purgatives, and of so misapplying them as really to do injury in cases where purging, judiciously regulated, is the best if not the only means of cure. The quantity of mucus secreted in the stomach and intestines under febrile excitement, which implies a general increase of vascular action, is often considerable. It lines the whole canal, and when accumulated (and more especially when inspissated by long retention) is the cause of many powerful medicines passing through without producing their ordinary effects; for in consequence of the interposed mucus, the medicines come imperfectly or not at all in contact with the living fibre on which alone they can act. They pass, therefore, as if either the living fibre were torpid or the medicine inert, when neither supposition would be correct. This is signally the case with respect to the stomach, the accumulated mucus of which is often thrown off like a dense membrane. In this state of stomach we have oftentimes given tartarised antimony in grain doses quickly repeated to the extent of twelve or fourteen, ere vomiting could be excited, the matter discharged furnishing abundant evidence why such inordinate quantity was needed. We mention the circumstance here in order to enforce the expediency of judging on all occasions, not from the quantity of medicine administered, but from the effect produced; and, as the principle applies no less to the bowels than to the stomach, to impress the indispensable necessity of a constant inspection of the alvine discharges, without which it is impossible to form an accurate judgment either of the propriety of purging, the selection of purgatives specially indicated, the extent to which their operation should be carried, or the period for which their use should be continued.

It has been shown that the derangements of circulation incident to a state of plethora, whether absolute or relative, manifest an uniformity which serves to mark the nature of the morbid changes induced, and to illustrate the processes which nature institutes in her endeavours to effect her own relief. Redundancy of nutritive matter first excites the healthy functions to increased energy, tending to its appropriation by natural secretion: when too much urged this energy abates, and feebleness of arterial action ensues; to this succeeds a state of general excitement, such as is expressed by the term fever; and finally some local congestion or inflammation occurs, producing what is called a specific disease. From this view the dependency both of the general fever and local affection on the constitutional state is at once perceived; and the treatment by which these are severally relieved acquires thence a clearness and consistency which no speculative theory of disease has ever yet imparted. For absolute plethora in its simple state, it has been shown that depletion and abstinence, the remedies directly suggested by a knowledge of its cause, are those which experience proves to be most efficient, and which may alone give full relief. For the active fever and local inflammation induced by this condition, the same means are essential, and are still the most powerful of all that can be employed; though when these derivative maladies occur, other evacuations besides that of blood are needed, it being here required to call forth the energies of all the excretories of the system in aid of those constitutional efforts by which the febrile excitement is aroused. In relative plethora the morbid condition of the system is less simple, yet it still corresponds with the other throughout. Owing to the duration of morbid actions antecedently to the occurrence of febrile excitement, the constitutional derangements are more extensive; more functions are depraved; the difficulty of restoring these severally to a healthy state is increased; and a longer time is required to correct their aberrations and renovate their powers. During this period, too, various disturbances, originating in depravation of nervous function, become intermixed with the ordinary symptoms, complicating and obscuring the whole. To these latter we shall have occasion to advert more particularly by-and-by. In absolute plethora the purpose is simple. If the redundancy of nutriment be diminished, and a fresh supply withheld—in other words, if bloodletting and abstinence be carried to the requisite extent, the powers of nature, thus relieved, are amply sufficient to re-adjust all that is amiss, and perfect health becomes restored.

No artificial stimulus is here needed to arouse the natural powers; but, on the contrary, the chief care is to restrain them within salutary bounds. In relative plethora, while depletion and adaptation of diet are equally necessary as in positive, more care is necessary for maintaining in due activity the several secretories, and some degree of stimulant treatment requires to be combined, in order to excite and support those increased energies of the system by which alone this condition can ever be thoroughly rectified. Ordinary stimulants, however, which merely excite the heart and larger vessels, are inadequate to this end. Nay, they do mischief; for they lead to no effectual exercise of power, and from that which they do excite, exhaustion rather than benefit results. The great deficiency of power which here prevails is in the capillary vessels, and to depravation, abatement, or suspension of their functions, may all the coincident derangements of the frame be readily traced. The two most essential processes of animal life are nutrition and excretion. These are exclusively performed by the capillary vessels, on the due energy of which they are dependent. When from any debilitating cause these minute vessels fail in power, or become obstructed, both

nutrition and excretion must become impeded; and hence we can understand why emaciation often takes place, even when there is a redundancy of nutritive matter in the general circulation, available for nutrition if the capillaries could so dispose of it. It is hence also intelligible, how a debilitating impression made on the system has, through abatement or suspension of the capillary function, the direct effect of throwing back upon the mass of blood that which in ordinary course the capillaries would have disposed of, and of thus inducing a state of relative plethora. It is clear from this view, that the object of treatment in relative plethora is not merely to remove the relative excess, although this demands its full share of attention; but also to renew the activity of the capillaries, in order, first to re-establish their healthy functions as essential to the well-being of the general constitution; and secondly, by thus providing for the just appropriation of the nutritive matter supplied by the blood, to restore that balance between appropriation and supply without which health cannot subsist, and which the occurrence of plethora, however induced, never fails to disturb. We have stated that ordinary stimulants, which produce but transient excitement of the heart and larger vessels, are not the remedies here needed. What we require is an agency which, without exciting inordinately the general circulation, is capable of acting on the capillary vessels, and of arousing them to a renewal of their several functions both secretory and excretory. Such a remedy we happily possess in mercury, which is singularly endued with this peculiar property, and which, in consequence, affords a powerful agency in relieving the larger blood-vessels, when overcharged, from part of their excessive load, by causing it to be diffused more freely through their numerous and wide-spreading ramifications; and when the aggregate capacity of the minute vessels thus expanded and restored to the exercise of their natural functions, is estimated, there will be little difficulty in comprehending how mercury proves so powerful an auxiliary of bloodletting in relieving an overcharged state of the general circulation, as well as in correcting the congestions and other derangements to which this state gives rise. If the effects of mercury on the animal frame be examined, it will be seen that, however diversified, they all correspond in one respect—namely, in evincing increased action of capillary vessels. Mercury has the effect of increasing almost every secretion, and by capillary vessels all secretion is performed. It promotes transpiration by the skin, diuresis, and secretion of bile; it more especially excites the salivary glands; and there is reasonable ground of conjecture that it similarly affects the pancreas, to the increased secretions of which gland mercurial diarrhœa has been with some plausibility ascribed. It increases the intestinal discharges independently of its direct action on the bowels when taken internally, for mercurial frictions are well known occasionally to purge. In every effect which mercury induces this common character is observable, that capillary action is more or less excited. Now a renewal of capillary action is what has been shown to be needful for correcting the derangements incident to relative plethora, and hence the inestimable value of this remedy when judiciously administered, in restoring to health those who suffer under such derangements.

In absolute plethora the febrile action aroused suffices to impel blood into every extreme vessel, and thus to equalize circulation by extending it to every part where nature requires its full activity; and to effect this seems to be the great end for which febrile excitement is instituted by nature. In relative plethora this effort is more feeble, the natural powers being weaker, (indeed it is in this natural weakness that relative plethora has its origin;) and as every day but adds to the labour to be performed, while under the general depravation of habit the natural powers tend to further decline, we have little difficulty in comprehending why this state does not become aroused to those energetic efforts which are so often witnessed in the active fever of absolute plethora. To excite such effects then by the peculiar stimulus of mercury becomes an essential part of the treatment of relative plethora; and when in the correction of this state mercury is used with the necessary discrimination, and in aid of bloodletting, no course of medical treatment can be more successful, nor more strikingly illustrative of the principles by which it is guided, than that which this combination of depletory and stimulant agency supplies. The principle here adduced is confirmed by all that we know of the action of mercury, whether in its abuse or its use. Consistently with the views here presented, this action ought to be salutary only when the labour to be performed is not beyond what the animal powers are capable of sustaining. If the labour be too great, if inordinate plethora prevail, then must the excitement of mercury fail to effect its object, and the animal powers, exhausted by the vain effort, must still further decline. This operation of mercury corresponds exactly with the course of active fever where no bloodletting is employed. The powers exercised are in either case considerable, but the labour is disproportionate, and they sink under it. But if the labour be lightened by lowering the nutritive quality of the blood, (and this can only be effected with the necessary promptitude by bloodletting,) then will both febrile action and that of mercury accomplish all that is required from them.

We must here call attention to a physiological truth which requires to be borne in mind. When nutritive matter is introduced into the blood, if it find not an outlet by artificial bloodletting or natural hemorrhage, it must go through the processes of secretion and excretion ere it can be again expelled. If it be so redundant as to require these functions to be inordinately exercised in disposing of it, the respective organs lose power, and from the over-excitement sink even below the natural standard. Bloodletting, by lowering the quality of the blood, and lessening the proportion of its nutritive constituents, supersedes much of this inordinate and unnecessary labour, and thus actually saves animal power instead of expending it. In absolute plethora this is all that is required, for the natural powers thus relieved are fully equal to accomplish their own work. But in relative plethora the case is somewhat different. Here, while the nutritive matter

of the blood is relatively redundant, requiring to be reduced, the animal powers are also enfeebled, and the several functions dependent on the capillary vessels are all more or less depraved. In addition, then, to reducing the nutritive matter by abstracting some blood, it is here necessary also to excite both the general powers and the capillary actions, in a way more effectual than simple febrile excitement can accomplish. Here mercury comes appositely and powerfully in aid, and by its direct influence on the capillary vessels effects what the natural powers, even when aroused into febrile excitement, would under such circumstances be unable to perform.

An analogy has been traced between the action of mercury and febrile excitement; and if this be followed up by closer observation, the respective processes will appear little short of identical, the only difference being in the excitant by which these processes are instituted and maintained. In absolute plethora the redundant nutritive matter suffices to arouse the system to corrective efforts: in relative this is inadequate, and the excitement of mercury is needed for stimulating to due activity the arteries, more especially in their minuter ramifications. This it effects in a way so closely corresponding to febrile action, that when the full effect of mercury is produced, it would be difficult to show that its phenomena differ essentially in any respect from those of fever. There are induced a quick pulse, hot skin, white and furred tongue, muscular debility, increased secretions, attenuation,—in short all that characterizes simple fever. And further, if this state be neglected or maltreated, it passes into one which exhibits the whole train of typhoid symptoms—black and dry tongue, accumulation of sordes on the teeth, prostration of power, high nervous excitement, and finally death. These consequences are attributable, not to any necessary effect of the remedy, nor to any poisonous properties inherent, but to the constitution not being prepared by sensible depletion for its safe and salutary exhibition. When mercury is administered in unreduced plethora, and especially when its use is rashly urged, the effects are precisely such as result from febrile excitement, when, besides being inordinate in degree, it fails in its corrective agency. The excited powers, exhausted by their efforts, fall into a state of collapse, the object for which they were exercised is not attained, the capillary actions are either not renewed, or if renewed they are overworked, and thus again enfeebled; they are consequently incapable of ministering to the general restoration as they would do if their healthful functions were re-established; and the consequence is, that the constitution is left in a far worse state by the effort than if it were not made. Far different is the result when either febrile excitement or the action of mercury is regulated by the guidance which sound principles supply. If plethora be reduced, and a state of active secretion be maintained, then may either febrile action, or that of mercury, be rendered conducive to the restoration of health, through renovation of functions such as seen almost beyond the reach of other influences.

The evils occasioned by neglect of the principle here inculcated, are abundantly displayed in the history of syphilis; and we believe that all experienced surgeons are now agreed on the danger of administering mercury in an overcharged constitution.

Enough has now been stated to display the principles which should guide the employment of mercury in the treatment of relative plethora, and of the manifold diseases incident to this condition of the frame; and from long and extensive experience and close observation, both of diseases and the operation of remedies, we can confidently affirm, that if the principles here inculcated be applied to the elucidation of diseased conditions; if in these the attendant state of constitution be regarded rather than the specific disease, and at all events in connection with it; and if the treatment indicated by the foregoing principles be employed so as to correct the constitutional derangements, many an apparently formidable malady will insensibly subside without requiring any specific treatment to be directed towards it, its surest corrective being the removal of the causes in which it originated, and by which it was upheld.

The practical application of these principles in the treatment of relative plethora, is simple in the extreme. If the diseased condition be of recent occurrence, and the depravation of the capillary functions slight, very moderate evacuations and renewed activity of the secretory and excretory functions, with regulated diet, will suffice to restore health. But if the plethoric state have continued so long as to deprave materially the general habit; if the capillary functions have been so long inactive as to have become indisposed to a renewal of their healthy energies; if the secerning vessels have, through their abortive efforts, become obstructed and powerless; and if, through congestion or subacute inflammation, structural changes have commenced in any of the organs or tissues, then these simple means must fail, and some constitutional effort, such as is exerted under febrile excitement, is necessary for restoration. But as natural febrile action is in this case inadequate to effect what is required, we here need the artificial excitement which mercury supplies, to accomplish the purposes which medical treatment has in view. The indications by which the use of mercury is to be guided, are neither obscure nor equivocal. If there be the debility of incipient plethora, moderate evacuations will relieve the vital powers, and enable them to display their inherent energies. When febrile action is thus aroused, the course of procedure is clear, and if the powers called forth be adequate to effect perfect restoration, no artificial excitement can be needed. But should it be, as in the larger proportion of such instances will prove to be the case, that the natural powers are feeble and inadequate to maintain the curative processes by which a healthy state of capillaries is to be renewed; if the obstructions be considerable, and the indisposition of the capillaries to a renewal of their natural exertions be clearly marked, then is the stimulus of mercury indispensable, and for this end there exists not, in the wide range of medicinal agency, a remedy possessed of powers so certain or so manageable. We have medicines which emulate some of its properties; antimony promotes many of the capil-

lary secretions; iodine promises to afford much valuable aid of a corresponding kind; but so far as our present knowledge extends, we have no medicine entitled to rival mercury in the properties which the foregoing observations ascribe to it. When a soft, calm, and firm pulse evinces a healthful state of circulation; when the several secretories and excretories cease to display in their products a morbid condition; when under these changes the general feelings improve, and health progressively amends, it is quite needless to exceed the means by which a change so favourable has been effected, and far better is it to trust to this slow but sure process of amendment, and await the time necessary for completing it, than by over-anxiety for more rapid progress hazard the disappointment which too sedulous endeavours might occasion.

But when the constitutional efforts do not make perceptible advance in the removal of general indisposition and local derangement; when the pulse continues oppressed, the skin dry, the tongue irregularly coated or otherwise unhealthy, the excretions morbid, the aspect sallow, and the general feelings unrelieved, then if depletion have been employed, and carried to the extent which sound experience justifies, it becomes absolutely necessary to resort to that agency which mercury supplies, and to administer at intervals small and unirritating doses of this mineral, so as to excite the animal powers to the efforts necessary for relief.

It occasionally happens that in this use of mercury too much excitement follows, and from this circumstance its inexpediency has been at times somewhat hastily inferred. The occurrence may no doubt proceed from the medicine being unsuitable; but it may also take place either from plethora not having been sufficiently reduced, or from the medicine being too freely administered. In these latter instances, further depletion and reduction of dose are what reason would direct. Precipitately to withdraw the remedy under such circumstances, without trial of the expedients here proposed, would be little reconcilable with that knowledge of the operation of mercury which all should possess who venture to prescribe it. In general, it is advisable to continue its use until its constitutional effects are evidenced by slight affection of the gums; but this is not indispensable, for we have often seen its curative effects obtained without any soreness of mouth being induced. Much minute detail on what is called the alterative effects of mercury, and the modifications which its exhibition continually requires, might here be introduced, but it would encumber an article already too long, and it cannot be needed.

No morbid condition can more clearly illustrate the operation of mercury than that which the advanced stages of continued fever present. Such cases have often been consigned to us as hospital patients when the early treatment had proved unsuccessful. The phenomena of this stage of the disease we need hardly describe. Great emaciation, prostrate powers, a feeble and rapid pulse, black and dry tongue, lips and teeth covered with sordes, insensibility, with a train of corresponding symptoms, characterise this stage. Yet, appalling as is the condition here presented, we never despair of it, provided no organ essential to life have yet suffered irreparable injury. Stimulants to recruit power are of course needed; but the chief agent for exciting the several secretory and excretory vessels, and for renewing the activity of the capillaries generally, is mercury. By small doses of this, repeated at suitable intervals, the pulse is rendered fuller and firmer, the secretions improve, the tongue becomes moist and clean, sordes separates from the teeth and lips, consciousness returns, appetite revives, and sleep is restored. Large doses are not needed; from one to two grains of calomel, given three or four times in the twenty-four hours, will generally suffice. Aperients and nourishment are of course required, and wine to such extent as the existing debility may demand. This effect of mercury we have so often witnessed that we can entertain no doubt either of the correctness of what is here stated, or of the agency to which the amendment is owing. No subject in pathology can be more interesting than the progressive development of power and improvement of function which such a case presents. It has repeatedly occurred to us to see so much reaction thus aroused as to require actual depletion of blood at late periods of the disease to relieve the local determinations which resulted. In the same subject we have been obliged to apply leeches alternately both to the head and chest, in order to allay the respective local excitements. That these resulted from the use of mercury we were well assured, but, instead of withdrawing it under a false alarm, we relieved the local disturbances by depletion, continuing a guarded use of the mineral so long as its specific agency was required for the re-adjustment of the system.

The accordance of the principles maintained throughout this article with the best established doctrines of idiopathic fevers cannot fail to be perceived by those who have given to this latter any particular attention. Dr. J. Armstrong, in his excellent treatise on typhus, distinguishes three stages in the disease, namely, those of congestion, reaction, and collapse. It is in confirmation of his accuracy that a corresponding succession, differing only in the intenseness of each stage, may be traced in every instance where simple inflammatory action arises, a circumstance which claims for his theoretic views a high credibility, by showing that the essential phenomena of continued fever do not result from any peculiarity of character imparted by its special cause, but that they correspond accurately with the successive processes which nature institutes in the simplest febrile disturbances of the animal frame.

Even the minuter observations which we have made on the changes of the pulse, and which were derived from the examination not of idiopathic fever but of incipient plethora, correspond with what Dr. Armstrong states as occurring in the congestive stage of typhus, among the symptoms of which he notices "a quick, low, struggling pulse, *changeable as to frequency, and even irregular as to force.*" But the most impressive illustration of the debility connected with internal congestion, and of the effect of copious bloodletting in relieving it, is, perhaps, that which is furnished by the epidemic, or, as it is commonly termed, spasmodic cholera.

In the pamphlet published by the London General Board of Health, by authority of the Privy Council, the following passage occurs: "But the remedy which is described to have been most uniformly successful, when it could be used, is bleeding, and this even in cases where the pulse was scarcely perceptible at the wrist. This practice seemed to apply itself to the root of the disease, by relieving the congestion of the venous system, which was invariably found loaded on examination after death, and which congestion (though only an effect of the first impression made by the attack of the disease on the constitution) appeared to be the immediate cause of death. In the lighter cases, or in those of a severe nature which came under medical treatment before the pulse at the wrist was lost, or had become fluttering, bleeding was attended with the most decided advantage. The oppression of the chest, the burning heat of the præcordia, the spasms, the vomiting and purging, are stated in some instances to have ceased at once; at others, on a repetition of bleeding. In such as allowed a free abstraction of blood, these effects very uniformly occurred; but even in some, when the pulse was indistinct, bleeding was successful, if it could be carried to the extent of eighteen, twenty-four, or thirty ounces, the pulse rising in power and becoming more distinguishable in proportion to the flow of blood. If the pulse in this state of feebleness was distinct enough to give the finger the feeling of oppression, bleeding was almost always successful. The blood drawn was black, whether procured from a vein or an artery, and flowed with great difficulty, commonly first coming from the vein in drops, and gradually in a stream; but before it could be induced to flow with freedom the patient often required warm baths, frictions, external and internal stimuli, to produce a sufficient quantity for his relief. If a small quantity only could be procured, the heart seemed to feel the loss without being relieved, the bulk of the blood actually circulating being reduced, while the great mass of it, congested in the inferior and superior vena cava, did not make its way to the heart. The effect of bleeding was mechanical, and acted only as removing an obstruction to the passage of the blood from the distended venous system; and if not carried far enough to remove this impediment and allow the large veins to empty themselves into the heart, such weakness was produced as is occasioned by the loss of blood in a constitution worn out by disease." This statement of the Board of Health we adduce in preference even to the authorities from which it was derived. It was the result of deliberate and mature consideration of all the information which public records and private testimony could supply; it was issued to the public under a responsibility which must have precluded all slovenly examination of facts, all influence of speculative theories; and it hence carries authority as an announcement of facts, which no individual testimony could possess in an equal degree. It is difficult to conceive a correspondence more complete than that which subsists between the facts here recited and the pathological principles which we have endeavoured to illustrate throughout the present article.

It cannot fail to be perceived how intimately these principles are connected, not only with the morbid conditions described, but also with the whole course of medical practice. If such morbid conditions of the frame have any existence, they must more or less affect the progress and influence the treatment of a large proportion of diseases. Wherever they prevail it is obvious that the treatment of specific maladies cannot be wholly independent of them, and even where no plethora exists, the negative can only be ascertained by a familiar acquaintance with the phenomena which denote its presence. Nay, so many specific diseases depend wholly on the depravations of habit noticed in this article, that when the constitutional derangements are correct, the special diseases spontaneously cease. On every account, then, the doctrines of plethora, its rise, progress, and treatment, must be allowed to constitute an essential part of medical science.

But of all sciences, that of physic is perhaps the least simple. Its principles, individually considered, are clear deductions from well-established facts, and, so far, simple in their nature. But it very rarely happens that any one of them, however irrefragable, suffices for our guidance. Morbid actions, however simple in their origin, become so soon combined with others, whether derivative or contingent, that the assemblage manifested in every instance of advanced or specific disease loses all character of simplicity, and requires for its exposition a variety of knowledge, a clearness of conception, and an accuracy of judgment exceeding perhaps what any other earthly pursuit demands.

A most important complication of vascular derangements is that which is derived from coincident disturbance of nervous function; and so continually are these conditions intermixed, that the consideration of plethora would be incomplete if this source of complication were unnoticed. As a matter of fact, it is familiarly known that inflammatory diseases of the same general character and denomination present in different individuals different phenomena according to the degree of nervous irritability respectively attendant. The predominance of this latter may proceed from peculiarity of temperament, or from the influence of stimulants particularly exciting the nervous system, in operation antecedently to the special disease, and independent of it; or it may result from cerebral congestion or irritation incident to the febrile state which plethora is seen to induce. It is further known that nervous irritability, when in excess, is capable of producing derangements which so much resemble those of pure inflammation as frequently to mislead practitioners into employing active depletory treatment where this is unsuitable, if not absolutely injurious. It is time that these several conditions and their combinations should be more fully investigated and better understood, were it only for guarding against an error to which recent enquiries on this subject seem to tend,—namely, that of regarding the inflammatory and irritative states as opposite and contradictory; so that where one state is proved to exist, the other must, by implication, be considered as negatived. The truth of such a position we would not admit; and we are anxious to dis-

play the grounds of our persuasion in this respect, entertaining as we do considerable apprehension lest the views of nervous excitability which some able and discriminating writers have of late years presented, (or rather the practical evidences which they have adduced of this being preponderant in certain maladies which had been very generally regarded as purely inflammatory,) should withdraw attention from inflammatory action beyond what the writers alluded to contemplated or would have approved.

The morbid irritability which, simulating inflammatory excitement, gives rise to local disturbances liable to be confounded with pure phlegmasiæ, and which, however it may be temporarily alleviated by bloodletting, is eventually aggravated by it, while it is relievable by opium and ammonia, has been ably illustrated by the late Dr. Gooch in his valuable "Account of the Peritoneal Fevers of Lying-in Women," and also by Dr. Marshall Hall in an "Essay on some Effects of Intestinal Irritation," as in several other of his works. In all that these judicious and eminently practical writers have adduced respecting this condition, and the treatment required for its relief, we entirely concur; but in admitting fully the truth of their statements, we are anxious at the same time to impress that though the higher degrees of irritability may exist independently of plethora or of inflammation,—nay, may have their origin in actual inanition or in excessive loss of blood, the same nervous depravation is continually found combined in every proportion with plethora, inflammation, and congestion; and that when it is so combined, the treatment, to be safe and effectual, must have relation to both sources of disease. In proportion as plethora and inflammatory action prevail, must depletory treatment take the lead; and according as irritability is excessive, will opium and stimulants be needed. To discriminate these respective conditions, then, so as to assign to each its appropriate treatment, is the point to which practical observation would be most beneficially directed. And in this scrutiny much advantage will result from founding diagnosis not on one or two prominent symptoms, but on the whole assemblage; among which, as was remarked in a former part of this essay, such harmony should subsist that no individual symptom should be contradictory of what the others proclaim. When such contradictions present, then, instead of leaning exclusively to that side to which the balance inclines, each class of symptoms should receive its appropriate consideration, and be referred to the principles in which it originates. In the morbid conditions under discussion, it is not difficult to distinguish the purely inflammatory cases from those in which excess of irritability is combined. In the latter, while the disproportionate degree of irritability should itself excite suspicion, a scrutiny of symptoms will show that these do not all in equal degree denote such activity of inflammation as the prevailing irritability would imply. The pulse, temperature, and tongue do not present that correspondence of derangement which is usually attendant on purely inflammatory action. The pulse, however accelerated, (and in such cases it is often inordinately so,) wants the firmness which belongs to inflammation. The temperature is not always in accordance with the high sensibility evinced by particular parts of the frame; and the tongue, instead of being dry or furred, is oftentimes moist and preternaturally red. So endless, however, are the varieties induced by the combinations which occur, that it would be impossible to render a distinct account of them by any description, or to do more than to point out the sources of disease to which the practitioner's own observation should be directed.

For plethora and inflammation the appropriate remedies, as we have often stated, are bleeding, purging, and antiphlogistic treatment; while morbid irritability yields but to opium and other sedatives, combined, as occasion requires, with cordials and tonics. In proportion as either condition prevails, must its appropriate remedies be combined in the treatment; and on the accuracy with which these remedies are severally adapted does much of the success of medical practice depend.

The subject is much too copious to be discussed fully in this place, where our chief object for introducing it is to impress a warning against hastily inferring, that because irritability predominates, inflammation or congestion is not co-existent. Even where morbid irritability results from exhaustion or inanition, congestions continually occur which call for topical bleeding, however unsuited depletion may be to the constitutional state existing, and even though to sustain strength by tonics and nutritive diet may be at the same time required. This is well exemplified in a state of disease of frequent occurrence, and with which most practitioners must be familiar.

Females under too protracted lactation fall into ill health, marked by exhaustion, and attended with various nervous derangements. This state is common among the poor, who, for various reasons, are accustomed to suckle their children for long periods,—even for two or three years. Pallid aspect, disordered digestion, irregular bowels, and acute pains of head, with prostration of strength and great nervous irritability, are the prominent features; but the whole condition thus induced is so peculiar and characteristic that they who are familiar with it are at once led to a knowledge of the cause by inquiries which they might otherwise not think of making. Taught by experience, we have oftentimes, among the out-patients of the hospital, discovered the fact by direct inquiry where there was nothing save the general character of the disease to induce suspicion of the woman being engaged in suckling; there being either no child produced, or one able to walk by its mother's side. Weaning the child is here the indispensable requisite; and its effects are quickly displayed. They are assisted by mild aperients combined with sedatives, cordial remedies, and sustenance. No state would appear on principle less suited for evacuant treatment than this; and under this impression we were for a long time averse to relieving the head by any direct depletion. The inveteracy of the headach, however, forced us to the application of leeches; and the prompt relief which they afforded soon removed all scruples on this score. A few suffice; six or eight applied to the temples give in general all

tne relief required; but nothing can be more decisive, or more strongly marked than the benefit which they thus afford.

We do not say that all such cases require leeching, but the attendant headach yields readily to this remedy when all others fail to subdue it. The only inference which we can draw is, that notwithstanding the general debility and perhaps by reason of it, the vessels of the brain become congested and unable to unload themselves; that the topical bleeding, by lessening their contents, enables them to contract and recover their natural diameter, and with it the power of carrying on the circulation so tranquilly as no longer to disturb the cerebral functions.

The above state only displays congestion as coinciding with irritability and exhaustion; but the instances are of daily occurrence in which morbid irritability is complicated in every variety with relative plethora; and when these states are so combined, it is quite as necessary to correct the plethora as to allay the irritation, the most effectual way of restoring health in such case being, not to pursue any exclusive system, but, guided by experience, to give to each derangement the consideration which it specially claims, and to combine the respective remedies as the prominent derangements may severally demand. A knowledge of the principles on which each class of remedies should be employed furnishes the best guidance for regulating those combinations which such complex states of disease must ever require. One of those conditions, at least, we have endeavoured to illustrate in the foregoing pages; and however we may have failed to do justice to the subject, it is hoped that sufficient ground has been shown for pursuing the inquiry, and a motive furnished for other observers to complete what we must necessarily leave imperfect.

Before concluding this article, it is necessary to offer a few remarks on the vitiation of blood which arises from redundancy of excrementitious matter, regarding this in its simple state, unconnected with the various degrees of plethora with which it is so continually combined. In doing so the motive is not so much to designate the morbid condition as likely on its own account to become an express object of medical discipline, as to establish the principles which should govern its treatment, when, as continually happens, it is found combined with other derangements. The general phenomena which denote this condition are, a sallow aspect and dusky skin; the pulse low, soft, and compressible; the surface of the body for the most part harsh, dry, and obviously deficient in natural transpiration; the tongue moist, clear, red; the appetite capricious, often craving and voracious, with an endless train of dyspeptic ailments; the alvine discharges inveterately foul, dark, slimy, pitch-like, and exhibiting no trace of healthy fæces; the urine high-coloured, depositing more or less of dark, often fetid sediment: these, with decline of flesh and strength, are the general characteristics of this state. The condition itself we believe to arise from the accumulation in the blood of excrementitious matter imperfectly discharged, and the depraved state of the several secretions we regard as resulting from the laboured though ineffectual efforts of the constitution to accomplish, through their agency, its own purification. It may give a clearer conception of this condition to contrast its phenomena with those which characterize nutritive plethora. In the latter the general aspect is more full and florid; the surface is hot and dry, or inclining to moisture; the pulse hard and frequent, or full, strong, and bounding; the tongue white and furred; the stomach inclining to nausea, with thirst; the stools feculent, though foul, and charged with mucus.

In specifying the symptoms of excrementitious accumulations, it may be imagined that we have included several which belong to the different forms of hepatic disease. That they are frequently regarded as evidences of diseased liver, and treated accordingly, we are well aware; but that they are certainly to be met with where there is no organic lesion of this viscera, nor any particular functional disturbance of it, we are fully convinced. It is true that the functions of the liver are, in common with those of the whole alimentary canal, greatly depraved, but they are so not from any primary defect or derangement of their own powers, but from being required to act inordinately on a vitiated mass which nature is sedulous to purify.

According as nutritive plethora becomes more or less combined with this state, the constitutional efforts increase, and various degrees of febrile and inflammatory excitement ensue. In proportion as this excitement is energetic, and as measures of suitable activity are employed for its relief, the vitiated state of the blood becomes corrected, the secretions and excretions improve, and the general health and strength amend. The increased secretions from the bowels seem to be the discharge by which nature aims at getting rid of such impurities. To promote them, therefore, by suitable purgatives, at the same time supporting the strength by moderately nutritive diet, is the first indication.

When relief, to a certain extent, is thus afforded, the powers of the constitution rally, and a febrile effort is made to assist in the work of purification. According as this advances, depletion should be more active and the diet less stimulating. When sufficient excitement exists to warrant the employment of bloodletting, we may then consider the curative process as in the most favourable train. Perhaps the powers of the constitution are hardly adequate to rectify any high degree of this derangement without the extraordinary effects which a state of febrile excitement supplies, and hence we see experienced practitioners often hail the appearance of febrile symptoms in chronic maladies as announcing a more remediable form of disease.

In every view that can be taken of this condition, it must be considered as intimately connected with the state of cuticular excretion, from defect of which it is more likely to arise than from any other cause. When we reflect on the large amount discharged by this excretory under a healthy state of the system, and that, according to accurate experiments, more than one-half the ingesta is carried off by transpiration, it will be readily conceived that great excrementitious accumulation must result from impeded cuticular excretion. This matter being in consequence thrown

in inordinate quantity on the other excretories, it can excite little surprise that their ordinary functions should be thence disturbed, or that their several secretions should present a morbid character.

A constitution naturally feeble, especially if exercise be inadequately taken, sends the blood to the surface too languidly for the exhalant arteries to act with full power, whence excrementitious accumulation commences; the effect of this being directly debilitating, it serves to aggravate the cause, and thus the foundation is laid for a broken constitution and many inveterate chronic diseases. The best preventive of this diseased condition is, unquestionably, exercise, and in slighter degrees of it this would also be the most effectual cure; but when great depravation of habit has already taken place, there is neither the capability of taking adequate exercise, nor would it alone, under such circumstances, succeed. To be effectual it should be carried to the extent of producing some moisture on the skin, as the only sure evidence of the blood being impelled with sufficient force into the capillary vessels. The various forms of warm bathing are of great value, especially those which combine frictions and other means of softening and detaching hardened cuticle. That of the Russian vapour-bath, noticed by northern travellers, and so accurately described by the late Dr. Clarke, would appear eminently calculated for establishing a healthy state of skin, and an adequate activity of cuticular excretion.

E. Barlow.

PLEURISY, PLEURITIS. *Gr.* πλευρῖτις, from πλευρὰ, *the side*, also the membrane that lines the ribs, *the pleura*. Pleurisy signifies inflammation of the serous membrane which lines the cavity of the chest and invests the organs of respiration therein contained. Modern pathology has narrowed the application of this term, which, in the earlier ages of medicine, was employed to express pain of the side, no matter what tissue was the seat of the uneasy sensation, provided it was acute in its character and accompanied with fever. The frequency of the complication of pleurisy and pneumonia led many to suppose that the former was so essentially connected with the latter as to be incapable of an independent existence. It is, however, now clearly established that, although the parenchyma of the lung, and its enveloping membrane are often involved in the same inflammation, still there is no necessary connection between the affection of the one and that of the other.

If adhesions between opposite surfaces of serous membranes are to be looked upon as evidence of pre-existing inflammation, the frequency with which we meet with this morbid phenomenon between the pleural surfaces warrants us in asserting that no organ or tissue in the body is more subject to inflammation than the pleura.

Pleurisy presents itself under so many varied forms, that we shall find it difficult to exhibit it in one general description. It may be acute or chronic; it may affect one side of the chest or both sides; it may be general, involving the whole of one side, or partial, only involving part of one side; it may be simple or complicated; the complication may be either accidental or essential, and in the latter case the pleurisy and its complication stand to each other in the relation of effect and cause.

I. Acute Pleurisy.—The anatomical characters which the pleura affected with acute inflammation presents, consist of change of texture and change of secretion. We have also to consider the changes which the lung, compressed by the effused fluid, undergoes both in form, volume, situation, and other relations.

The inflamed pleura exhibits numberless minute capillary vessels carrying red blood; these vessels anastomose freely among themselves, and present injected patches of various forms. Sometimes the injection is so general as to appear like an ecchymosis. Careful anatomical examination proves these injected vessels to be situated in the subserous cellular tissue; and that what was considered an actual thickening of the serous membrane in the first stage of inflammation, is due to a serous infiltration into this cellular tissue, as well as to a loosening of the connection between the serous membrane and the subjacent tissue by the increased calibre of the capillaries, now carrying red blood. In some cases we can peel off the serous membrane, and thus prove the pretended thickening to be nothing more than what we have just stated.

Inflammation of the pleura induces changes both in the quantity and in the character of the ordinary serous exhalation. The first effect of inflammation upon the exhalation of a serous surface is, if not completely to suppress it, at least to diminish it very considerably; so that the dry surfaces have no longer that easy gliding motion which it is the physiological object of this lubrefying fluid to maintain. After an interval varying from an hour to two or three days from the commencement of inflammation, the serous exhalation is much increased in quantity, or, to adopt the language of pathology, the inflammation terminates in effusion. Laennec objects to this mode of expression, as calculated to convey an erroneous idea as to the time when the effusion begins to take place, as he is of opinion that in serous membranes the inflammation and effusion commence at the same moment, and proceed *pari passu*. With this, we must confess, our experience does not agree; and although in the larger cavities, viz. the abdomen, heart, and chest, our examination may not be capable of that degree of precision which would enable us to pronounce with certainty upon the point, still there are other cavities in which the train of morbid phenomena takes place more immediately under the cognizance of our senses, and where we have an opportunity of recognising a determinate interval between the supervention of the inflammation and the effusion; for instance, the joints and the tunica vaginalis testis. In iritis, we have ocular demonstration that it is some time after the pain has announced the inflammation, that the increased secretion of the aqueous humour takes place, causing an unusual prominency of the cornea.

The fluid effused into the cavity of the chest, in acute pleurisy, varies considerably in quantity; sometimes not exceeding an ounce, at other times amounting to several pints. When it is consider-

able, and has exercised a pressure upon the yielding parenchyma of the lung, reduced it to its smallest possible dimensions, and pushed down the diaphragm so as to cause the viscera placed below it to be felt lower than their normal situation, viz., the liver on the right side, and the spleen upon the left, it seems to be next directed against the walls of the chest, and produces a change in the form of the side, to which we shall have occasion to advert when we come to enumerate the physical signs of acute pleurisy.

The effused fluid presents itself under very various appearances. It may be colourless, transparent serum; or we may find flocculi of lymph floating in the serum without affecting its transparency; or, again, some of the lymph may be, as it were, dissolved in the serum, and, rendering it turbid, may impart to it an appearance resembling unclarified whey. Again, it may be a greenish fluid made up of serum and pus in various proportions, and approaching to each of these fluids in colour and consistence, according to the proportions in which they enter into its composition. Or it may be unmixed pus, resembling in its sensible qualities the matter of a phlegmonous abscess; and in this case the disease is ushered in with a strong rigor, the ordinary announcement of suppuration. Lastly, it may be either pure blood, or the ordinary serous effusion more or less deeply tinged with this fluid; the blood in this instance may be forced out either from the capillary vessels of the pleura in a high state of orgasm, or from the vessels developed in the organized false membrane.

In a case of acute pleurisy, which we have had recently under our care, and in which the urgency of the symptoms required the immediate performance of the operation of *paracentesis thoracis*, the fluid drawn off was of a yellowish colour and oily consistence, very much resembling in appearance copal varnish. On remaining a short time in the vessel in which it was drawn, it was converted into a tremulous jelly, and after some hours resolved itself into two distinct parts, a thickish crassamentum floating in a thin serum; it in fact very much resembled the blood without its colouring matter. The fluid having collected again, it became necessary, in the course of a fortnight, to repeat the operation, when we found the effusion to present very different sensible properties from those of the original fluid; it was of a greenish colour, and though apparently of a homogeneous consistence, on standing a short time, it separated into a thick, purulent sediment and a thin, greenish, supernatant fluid. This operation afforded a very temporary relief: the individual died in four days, and on examination we found not less than eight pints of thick purulent matter (such as is met with in a phlegmonous abscess) in the left side, and both pleura pulmonalis and costalis densely coated with lymph. The difference presented by the effusion on three different occasions constitutes the interesting feature of this case. Andral, in the second volume of his *Clinique Médicale* (*Sur les Maladies du Poitrine*,) mentions a case in which the fluid effused into the pleura resembled the jelly of meat.

A portion of the fluid effused in pleurisy has a natural tendency to pass to the solid state; from thence we have the false membranes, which present so much variety in their organization, form, extent, consistence, and thickness. The coagulable lymph is scarcely deposited upon the free surface of the pleura when it becomes solid. In the first instance it is a soft, whitish mass, exhibiting no appearance of organization or vitality; but soon red points make their appearance in it, which, elongating themselves into red lines, present unequivocal characters of vascular canals, and, passing beyond the lymph,—the matrix of their development,—proceed to inosculate with the vessels of the pleura, and thus establish a communication between the circulation of the false membrane and the general circulation. It is impossible to fix the time when organization takes place in these false membranes; nor is it easy to determine to what special influences this process is subject, evidences of such organization being found in false membranes, the result of pleurisy of a few days' standing, and being wanting in others of as many months' duration; thus, at least, proving that time is not the sole regulating circumstance.

The form assumed by the lymph deposited on the pleura is very various; sometimes it is deposited in isolated drops, having either the appearance of transparent vesicles or of miliary granules; at other times they closely resemble tubercles. In the differences presented by the lymph deposited in this form, we recognise the grounds of the opinion that hydatids are the form under which tubercles first present themselves, the transparency of these globular concretions countenancing such a belief. In a case of cancer of the lung, in which the cancerous matter presented itself in all the intermediate stages of development between hardened scirrhous structure and soft, dissolved, encephaloid matter, we found lymph deposited in the form of these isolated drops upon the pleura of the opposite lung, while the lung itself was quite free from disease. We suspect that lymph is the rudiment, or matrix, of all these morbid growths, which derive their special character from the peculiar cachexy of the individual.

Sometimes the lymph covers a greater or less extent of the pleura, in the form of concretions of variable density. The surface of these concretions is sometimes smooth and polished, sometimes it is rough and unequal, and sometimes it has an areolated, honey-comb appearance. In many cases, these concretions are converted into cellular bands, of variable length, connecting the two pleuræ, and are often found traversing the effused fluid. These bands acquire all the characters, both anatomical and pathological, of cellular tissue; they are subject to dropsical infiltration, and in jaundice present a yellow hue; they are often the matrix of morbid developments. That these bands do not fetter the motion, or in any way interfere with the function of the lung, is abundantly demonstrated by the fact of the frequency with which we meet them, in our necroscopic examinations, where we had no reason to suspect them during life.

The false membrane varies in thickness in different instances; sometimes it can be removed from the subjacent pleura in the form of a thin pellicle, not exceeding the thickness of the pleura itself. Most commonly the thickness of the false

membrane greatly exceeds the natural thickness of the pleura, and it seems to be made up of several distinct laminæ superposed. We have seen this membrane an inch thick, and the laminæ of which it was composed admitted of separation like the different laminæ composing the coagulum of an aneurismal sac.

As the false membrane resembles cellular tissue in its properties, it is subject to all the transformations of structure of which this latter texture is susceptible; thus it may be converted into cartilage, fibro-cartilage, or even into bone. It is this membrane, converted either into cartilage or fibro-cartilage, which, in phthisis pulmonalis, establishes such an intimate union between the pleuræ pulmonalis and costalis as to defy our utmost efforts to separate them.

The false membrane may be the matrix of different accidental developments, of which tubercle is by much the most frequent. We often find the surface of the membrane studded with small miliary tubercles: at other times we find these bodies in the substance of the membrane in their different stages of softening. We have no precise data whereupon to average the time when tubercles begin to form in the false membrane; and though we believe they may develop themselves within a very short period, we conceive the work of tuberculization in general to be a slow, insidious process, even in organs most essential to life.

The lung of the side, when the effusion exists, deserves our attention, both in reference to the position which it occupies, and the changes which it undergoes in its proper structure. In general the effused fluid tends to press the lung into the space beside the vertebral column, and when it is in considerable quantity, the organ is reduced to a thin lamina, so that sometimes it is not easy to find it, and thence we have heard of its having entirely disappeared. Adhesions will of course modify the position of the lung, and protect a portion of it from pressure. Sometimes the lung is applied against the ribs by being pressed backwards and outwards; at other times it is completely suspended in the fluid. In general the only change induced in the lung, pressed upon by the effused fluid, is a diminution of size, the mechanical effect of the peculiar circumstances in which it is placed. The air is squeezed out of it. The organ becomes more dense and less crepitating than natural; it assumes very much the anatomical characters of a fœtal lung; it has a smooth, uniform appearance, and does not tear as a portion of hepatized lung will do; its vesicular structure has quite disappeared, and even the blood-vessels are flattened and exanguious: the bronchial tubes become contracted in their calibre. Its resemblance to a portion of muscular tissue which has been submitted to maceration has procured for it the expressive term of carnification.

Tubercles may form in the compressed lung, and there undergoing their ordinary changes, will modify the symptoms of the disease; still it more frequently happens that the tubercles already existing in the lung, in softening, perforate the pleura, and give rise to that modification of pleurisy which might with propriety be termed *pneumothorax*. (Πύον, pus, πνεῦμα, air, θώραξ, chest.)

General Symptoms of Acute Pleurisy.—Acute pleurisy is well entitled to a place among the Pyrexiæ, from the symptoms of high febrile excitement with which it is in general announced; to these symptoms are superadded pain in the side, difficulty of breathing, a hard dry cough, and, usually, decubitus upon the unaffected side: upon these follow, sooner or later, a dulness of sound or absence of the ordinary resonance of the affected side when percussed, a peculiar modification of the voice designated ægophony, and bronchial respiration; then the complete absence of the respiratory murmur, and a palpable dilatation of the affected side.

The febrile symptoms of acute pleurisy are not marked by a uniform intensity. When the disease prevails as an epidemic, these symptoms partake more of a low typhoid type, and considerable derangement of the digestive apparatus holds a prominent place amongst them. The pain is unequivocally the most constant symptom of acute pleurisy; it is the one which especially attracts the patient's attention, and which, from the expression of anxiety and suffering which it imparts to the countenance, is seldom overlooked by the physician: it is described as a sharp, lancinating pain, increased by coughing, by inspiration, by pressure in the intercostal spaces, or by lying on the affected side; its situation is generally referred to near the mamma, and is felt in a very circumscribed space, no matter what may be the extent of the inflammation. It is not easy to explain why this should be the usual situation of the pain. Morgagni attempted to account for it by the greater mobility which this point of the chest presents, as being equally distant from the apex and base of the thorax, and from the sternum and spine. Though the point mentioned be the most usual seat of the pain, still it may be felt in any part of the side, or even in the opposite side, without this side participating in the inflammation.

When pleurisy depends upon tubercles in the pulmonary tissue, the pain is felt in parts of the chest corresponding to the situations of the formation of these foreign bodies; hence in the early or nascent stage of phthisis pulmonalis, we hear the frequent complaint of pain under and above the clavicle, in the hollow of the axilla, or between the shoulders, this pain indicating the existence of tubercles in the apex of the lung, the usual seat of their earliest development. This symptom of early phthisis is of much practical value, as it assists our diagnosis at a stage of the disease when the stethoscopic signs are equivocal, and when treatment interferes with most prospect of success.

When the pain is confined to the margin of the ribs, it is not always easy to determine whether it depend upon inflammation of the thoracic or of the abdominal serous membrane, and the difficulty is increased by the fact that jaundice has followed upon unequivocal pleurisy by an extension of inflammation of the pleura lining the diaphragm. Morgagni mentions a case in which Valsalva mistook the complication of jaundice for the primary disease, and overlooked the less palpable signs of a pre-existing pleurisy, proving how difficult it is

to establish a certain diagnosis when the situation of the disease is a point where many organs are, as it were, placed in the same parallel of latitude, and when the disease itself is not marked by any striking functional derangement. The pain is seldom constant, but is brought on by every thing calculated to impress the slightest motion upon the affected side; it sometimes assumes an intermittent character, and returns with a regular periodicity.

In the first moments of acute pleurisy, the respiration is marked by a peculiar nervous hurry. Nature is instinctively aware of the pain produced by a full inspiration, and therefore avoids it; she compensates for the smallness of the volume of air admitted at each inspiration by the frequent repetition of the act, and hence the respiration is short, hurried, and jerky (*saccadée*). When effusion has taken place, the dyspnœa depends upon a different cause, viz. the mechanical obstruction to the expansion of the lung, and is in proportion to the extent of the effusion and suddenness with which it has taken place. This latter circumstance has much more effect in embarrassing the respiration than the former, as we have known cases where individuals were quite unconscious of any thing affecting their chest, while at the same time there existed unequivocal evidence of extensive pleuritic effusion; and this arose from the organs having had time to accommodate themselves to the encroachment upon their functions. Should the opposite lung be affected either with bronchitis or emphysema, the dyspnœa will be more distressing.

The characteristic cough of acute pleurisy is a short cough, either dry, or accompanied with a thin mucous expectoration: should the sputa be more abundant or deviate from this character, we may suspect a complication either of pneumonia or bronchitis. The cough is often wanting altogether, or is so slight as to attract the attention of neither the patient nor the physician.

The difference of opinion which obtains among systematic writers upon the subject of the *decubitus*, or position of the patient in pleurisy, proves at least that it is not constant, and therefore cannot be exclusively relied upon as a diagnostic sign; still we may say that, as long as the acute lancinating pain of the side continues, the aggravation of it, caused by the pressure when lying upon this side, makes the individual seek the more easy position, either upon the opposite side or upon the back. When the pain has ceased, and extensive effusion taken place, the position, before avoided, is now adopted; because the effusion, interrupting the function of one lung, and placing it, as it were, *hors de combat*, a necessity for greatly augmented action devolves upon the other; and in order to favour this, nature instinctively points to the position which allows the easiest and most unembarrassed play to those muscles whose province it is to dilate the unaffected side of the chest, and this position is upon the affected side. It is only when the effusion has been sudden and considerable, when the respiration has (if we may be allowed the expression) been taken by surprise, that nature seeks to relieve herself by particular posture. It may happen that a fresh attack of inflammation in the side originally affected, or the lung hitherto free becoming involved, will produce the necessity for a certain position, to which nature in the first instance seemed to be indifferent.

Physical Signs. — In the earliest stage of acute pleurisy, there is no physical sign to mark its existence.

[Early in the disease, a rubbing, creaking, or friction sound is heard, which may indicate that the secretion from the pleura has been arrested by the inflammation, or, what is more general, it indicates that plastic lymph has been thrown out, the consequence of which is the friction — *frottement* — which, however, may be so slight as scarcely to merit the name of *frolement*, or "slight grazing sound;" but at other times is so loud as to resemble the "leather creak" — *bruit de cuir neuf* of the French. These signs, when combined with the general symptoms, are valuable in the diagnosis; but they are not of long duration, and may not, therefore, be heard. Friction sounds occur, also, in interlobular emphysema, and as this pathological condition does not speedily change, they persist longer. Recent researches, as remarked by Dr. Williams, (*Lectures, &c., on the Chest*, Amer. edit. p. 153, Philad. 1839,) would seem to show, that, as in the case of peritonitis, the sounds are not often produced in pleurisy, unless the lung is at the same time pressed against the chest by a tumour, or by effusion, or is partially distended by emphysema or tuberculous or other deposits. The sounds are generally most audible in the central parts of the chest, owing to the motion of the pleuræ upon each other being most marked in that situation; and in order to be heard, the patient should lie on his abdomen.]

When effusion takes place into the cavity of the chest, its extent is marked by percussion of the side yielding a dull dead sound, instead of its ordinary clear tympanitic resonance. This dull sound, it is true, may arise from other causes than from fluid effused into the cavity of the pleura; it may be owing to solidification of the pulmonary tissue, the effect of pneumonia; or to some morbid growth formed in the lung; still we can take such advantage of this sign as will enable us to determine upon what it depends; for although Laennec denies that fluid effused into the cavity of the chest can change its place, and states that it arranges itself between the lung and the walls of the chest, the experiments and examinations of Piorry on this subject, concurring with our own experience both during life, and confirmed by examination after death, enable us to assert that this fluid, being specifically heavier than the lung in its natural state, will displace it, and gravitate towards the most dependent part, and thus by change of position of our patient shall we be enabled to change the results both of percussion and auscultation. We believe the only internal limitation to the displacement of the lung to be the root of the organ; and when the effusion is considerable, and we examine the patient in the sitting posture, the weakness, if not the complete absence of respiration and dulness of sound, are owing to the fluid having pushed up, and now occupied the place of the lung; but as the root of the organ is its fixed point, when the fluid rises above its level, it is now that it presses upon it on

all sides, and when it has filled the cavity, the lung is, as it were, suspended in it, and, being retained here, undergoes different degrees of compression according to the extent of the effusion. The analogy of the fluid in ascites, displacing the intestines, confirms the view that we have just taken of the displacement of the lung by the pleuritic effusion. Adhesions between the pleura pulmonalis and costalis will prevent the fluid displacing the lung; and if we did not keep this fact constantly in view in our examinations, we should often be misled. We well remember the embarrassment which the usual phenomenon of distinct bronchial respiration produced in a case of unequivocal pleuritic effusion, related by Dr. Graves in the fifth volume of the Dublin Hospital Reports, and which an adhesion between the pleuræ pulmonalis and costalis afterwards accounted for. It is only when the dulness of sound and absence of respiration present themselves when we see the patient for the first time, that we can ever be at a loss to determine whether they depend upon pleuritic effusion or solidification of the lung; for the short time in which the whole side, or even its inferior half, will yield a dull sound, (sometimes occurring within a few hours,) is conclusive of its being due to effusion and not to hepatization, which is a very gradual result, and is always preceded by the crepitating râle. We may state generally that the sudden, equal, and uniform absence of respiration and dulness of sound are peculiar to pleuritic effusion.

When the effusion is very abundant from the first moments of its formation, the respiratory murmur ceases to be heard in any part of the chest, except along the vertebral column, where it is still perceptible for the space of about three fingers' breadth, although more feeble than on the opposite side. When, on the contrary, the effusion is gradual, the respiratory murmur begins by being a degree fainter, and continues to diminish its intensity until it is entirely lost. The respiratory murmur will survive the dulness of sound sometimes for days. When it has ceased in all other parts except beside the spine, it will often continue to be heard under the clavicle, in consequence of the frequent adhesions between the pleuræ pulmonalis and costalis in this situation in phthisis. To the cessation of the respiratory murmur or vesicular respiration succeeds a peculiar modification of respiration, which, from its apparent dependence on the air not penetrating beyond the larger bronchial tubes, has been termed *bronchial respiration*. As this same character of respiration exists in solidification of the lung in pneumonia, we may presume that it depends upon the same cause in both cases,—namely, the peculiar condition to which the pulmonary parenchyma has been reduced, in one by the compression of the fluid, and in the other by a deposition of foreign matter into its proper structure; so that the phenomenon would seem to depend upon the air entering the bronchial tubes, placed not in the midst of their ordinary spongy medium, but of a dense solid structure, and therefore better calculated to convey every modification of sound, whether of voice or of the entrance of air; furnishing us in the former instance with *bronchophony*, and in the latter with *bronchial respiration*.

The voice, as heard by the stethoscope, is observed to acquire a particular character in pleuritic effusion, which led Laennec to regard it as one of its most characteristic signs. From its resemblance to the shrill, jerky, tremulous sound of the goat, he has termed it *ægophony*. (See Auscultation.) This phenomenon is most perceptible about the inferior angle of the scapula, and in the space comprised between the posterior margin of this bone and the spine, and is found to exist only when the effusion has attained to a certain extent, and to cease when it either goes beyond or falls short of this: hence it is not met with either in the very early or advanced stage of pleurisy; and when it has been present and disappeared, its return is hailed as indicative of progressive absorption of the effused fluid. Laennec ascribes it to the transmission of the voice through the compressed lung and the fluid interposed between the lung and the side of the chest. As we before stated that our own experience, confirmed by Piorry's experiments, made us question Laennec's opinion of the stratum of fluid interposed between the lung and side of the chest, of course we cannot admit his *rationale* of the phenomenon, as far as relates to the transmission of the voice through this hypothetical interposed fluid. As the most experienced stethoscopists allow that they can with difficulty distinguish between ægophony and bronchophony, we believe the former to be a mere modification of the latter, and to differ only in the structure of the lung not having undergone an equal degree of compression: hence we see the reason why, in the earliest stage of pleuritic effusion, the compression has not been sufficient to produce the phenomenon; as the effusion increases, the compression is greater, and the phenomenon appears, the effusion increases still more, and ægophony gives place to bronchophony; as absorption takes place, the compression becomes less, and ægophony appears again; hence we have equal reason to hail the return of this phenomenon as an indirect expression of the diminution of the fluid, but an immediate result of the diminished compression of the lung, and not of the diminished interposed fluid through which the voice is transmitted.

When the effusion is considerable and has formed within a short space of time, the respiration in the opposite lung becomes puerile. The increased action which has devolved upon this lung strongly predisposes it to disease, differing, however, from the original affection: that is to say, the lung is more likely to become consecutively affected either with bronchitis or pneumonia than with pleurisy. When pleurisy is double, the two sides have become simultaneously affected, and their respective affections proceed *pari passu*.

When the effusion has proceeded to a considerable extent, it produces a change in the side, consisting in an actual increase of its size and form. It is remarkable how small a difference between the two sides, as ascertained by actual measurement, will strike the eye; an increase of six lines will have this effect. The change of form of the side consists in its becoming more rounded, and in the intercostal spaces being either effaced, or rising beyond the level of the ribs. In these spaces fluctuation can sometimes be detected. Change in

the form and dimensions of the side has been recognised as a diagnostic sign of pleuritic effusion since the dawn of pathology.

[The increased size, induced by effusion into the chest, is observable early; — Laennec says after two days' duration of the disease,—Andral says, on the fourth or fifth day. The writer's observation, as stated elsewhere, (*Practice of Medicine*, 2d edit. i. 389,) would lead him to fix the appearance of this phenomenon at a later period. It has been usually considered, that protrusion of the intercostal spaces is always coexistent. But this, as remarked by Dr. Stokes, (*On Diseases of the Chest*, 2d Amer. edit. p. 466, Philad. 1844,) may be wanting. Moreover, dilatation of the side may be absent, where even copious effusion exists, owing to the displacement of the diaphragm. The observer in making these comparisons must bear in mind, that the right side, in health, is often larger than the left. The average result of the most accurate admeasurements of 20 chests of persons not labouring under disease of the lungs gave, according to Dr. Stokes, for the right side, 17.86 inches, and for the left 17.23,—or more than half an inch in favour of the right lung. Of these, the most capacious chest measured 22 inches for the right, and 21.50 for the left. In one case only, the left side was larger than the right; and in three the sides were symmetrical. In the case in which the left side was more developed, the man was left-handed. In the work already cited, the writer has given the admeasurements of ten males and ten females, taken by himself or under his inspection—none of the individuals labouring under disease of the lungs. The average of these gave 16.92 inches for the left side, and 17.47 inches for the right in the male,—being a difference of about half an inch; 15.1 inches for the left side, and 15.2 for the right in the female,—being a difference of not more than one-tenth of an inch.]

When the effusion is on the left side it will have the effect of displacing the heart, and of causing its pulsations to be heard either on the right side or in the epigastrium; hence, if we miss the heart in its normal position, and perceive its action in either of these situations, we have very strong grounds to suspect, if not conclusive evidence of, this lesion. [See article Empyema.]

M. Reynaud has suggested a mode of ascertaining the existence of fluid effused into the chest, which consists in the application of the hand to the side where the effusion is suspected, and then making the individual speak, when the effused fluid will be found to interrupt the vibrations which the voice communicates to the walls of the chest when the lungs are sound.

[By placing a hand under each scapula, pleuritic effusion may, in this manner, be detected. Dr. Stokes, (*Op. cit.* p. 462,) regarded this sign as of far greater value than egophony. It does not exist, however, in many cases of females and of boys prior to the change of voice,—the vocal vibrations in them, although audible, not being sufficiently powerful to be felt by the hand.

The pectoriloquism of phthisis, and the egophony of pleurisy are regarded as the least valuable of the physical signs of these diseases; still, the presence of egophony with dulness on percussion, enfeebled respiratory murmur of the affected side, with absence of the crepitant rhonchus, and of the vibratory vocal fremitus, would be a strong combination of evidence in favour of the existence of pleurisy.]

Varieties of Acute Pleurisy.—Acute pleurisy may be double, that is, it may involve both sides of the chest at the same moment. This is by no means a common occurrence, and when it does take place, and is speedily followed by extensive effusion into both sides, the sudden and extensive mechanical interference with the function of respiration soon extinguishes life. Percussion affords us no assistance in forming our diagnosis in this case; for as we have no absolute standard of the degree of resonance which it should yield, it is by comparison of the two sides that we can alone judge; but the effusion, producing a dull sound in both sides, deprives us of the value of this physical sign. However, if we keep in mind the observations we before made upon the differences between pleurisy and pneumonia, and apply them to the subject under consideration, we shall have little difficulty in identifying this affection, and distinguishing it from the only modification of disease with which it could by possibility be confounded. Double pleurisy, but of inconsiderable extent, often takes place in the agony of acute diseases.

Partial or circumscribed inflammations of the pleura are very common. They in general produce no fever or constitutional disturbance, and are only announced by a pain more or less acute in some point of the walls of the thorax: the pain too is not a constant symptom. A slight exudation of lymph takes place, and this, in the course of time, is transformed into a cellular band. This is the history of those cellular adhesions which unite the pluræ pulmonalis and costalis more or less intimately. These adhesions have often been found in persons who, during life, never gave reason to suspect any affection of the chest. Although these partial pleurisies may exist alone, they more frequently occur in cases of affection of the pulmonary parenchyma. Phthisis pulmonalis is their most fertile source, and hence arise the frequent pains in different points of the side, of which the subjects of this disease so often complain. These painful points bespeak inflammation of the corresponding portions of the pleura, and in our subsequent examinations we find adhesive cellular bands in these situations. The number of these adhesive bands is, in general, in the direct ratio of the number of tubercles, and they exist particularly in points corresponding to those where the tubercles are most abundant: hence their most constant situation is between the apex of the lung and the summit of the cavity of the chest; the adhesion here is sometimes so firm as to defy our utmost efforts to break it.

Some partial pleurisies demand peculiar attention in consequence of the particular symptoms to which they give rise. Inflammation of that portion of the pleura which lines the diaphragm claims our especial consideration upon this score. Its characteristic features are, in addition to the ordinary constitutional symptoms of acute pleurisy, pain more or less acute of the cartilaginous border of the false ribs, extending into the hypochondria, and even to the flanks; complete immobility

of the diaphragm in inspiration, which is performed by the elevation of the ribs; orthopnœa, with an inclination of the body forwards; an inexpressible anxiety of countenance, marked by a sudden change of features; the respiration more hurried and jerky than in ordinary pleurisy; the voice low and interrupted, (entre-coupée;) a frequent desire to cough, but an obvious dread of it from the pain which it causes. The intellect is free at first, but when the case is aggravated, and the constitutional symptoms run high, delirium comes on. In addition to the symptoms enumerated, we have the ordinary physical signs of pleurisy; viz. in the first moments of the disease, if the pain will allow us to employ percussion, we find a disproportion between the sound it yields in the inferior part of the chest, and the distinctness with which respiration is heard in this situation, the latter being feeble while the former is clear; in the course of a short time the sound here becomes dull, and the respiratory murmur ceases to be heard, and these two phenomena extend upwards in proportion to the extent of the disease. When the effusion takes place into the right cavity of the pleura, it presses down the liver, and causes it to be felt below the margin of the ribs; when it takes place into the left cavity, it produces a similar change in the position of the spleen. The signs which we have just enumerated may be regarded as the most constant and unequivocal of diaphragmatic pleurisy; others are occasionally present, viz. hiccough, nausea, vomiting, jaundice, &c. It was the presence of jaundice that led Valsalva to regard the accidental complication as the original disease; a mistake which might naturally occur, if, as happens in many cases, the features of the preceding pleurisy had not been strongly marked. The risus sardonicus, to which the ancients attributed so much importance as characteristic of this modification of disease, has not been found constant by modern observers.

There is a partial pleurisy which claims our attention, in order to guard against a pathological error into which we might fall did we not conduct our investigation with care. We allude to interlobular pleurisy, in which the cellular membrane, the result of the present or of a former inflammation, connecting the lobes of the lung, may become the nidus of an abscess, which a superficial observer might easily mistake for an abscess in the substance of the organ.

It is almost superfluous to observe that partial pleurisies owe their importance to the extent of surface which they occupy: the more extensive they are, the more serious are the consequences. Preceding pleurisies, in which adhesions have been formed, limit the extent of future attacks; these adhesions, as it were, divide the cavity of the pleura into smaller cavities, and thus circumscribe future pleurisies.

Inflammation may affect either the costal pleura alone, or the pulmonary pleura, or both at the same moment. In the first case, it is not always easy to determine whether the affection be rheumatism of the intercostal muscles, or inflammation of the costal pleura; we have in each the same pain produced by the same causes, and the same modification of respiration, in the performance of which the ribs seem to take no share. When the pulmonary pleura alone is affected, the pain is produced by the air inspired stretching this membrane, and it is the effort to avoid this that gives the short hurried character to the respiration.

There is a neuralgic pain of the side which is sometimes mistaken for inflammation of the pleura, but which differs from it in being unaccompanied with fever, and in the character of the pain, which is represented as a burning or scalding sensation, and not as a sharp lancinating pain. The neuralgic pain differs from the pleuritic in being relieved by pressure.

Causes of Acute Pleurisy.—These may be divided into the predisposing causes and the occasional or exciting causes. Among the first may be enumerated congenital malformation, consisting in narrowness of the chest; a sanguine temperament; irritability of the system; weakened health from previous disease; convalescence from fever; the puerperal state. The exciting causes embrace all mechanical injuries directly applied to the pleura; such as contusions, penetrating wounds caused either by cutting instruments,* or by sharp spiculæ of fractured ribs; extension of ulceration from a softened tubercle in the substance of the lung perforating the pleura, and giving rise to a complication to which we shall have occasion to advert; cold applied to the surface when the cutaneous capillaries are in a state of excited action, &c. The mode of operation of the cause last mentioned is supposed to be by directing the fluids from the circumference to the centre, and thus determining their afflux to the serous membrane; and as this cause has also the effect of producing a congestion of the parenchyma of the lung, and, in consequence, a tension and stretching of the investing pleura, it was supposed that in this way it contributed to produce pleurisy. The frequent complication of intermittent fever with pleurisy further countenanced this idea. However, we cannot but consider the rationale of this cause as too mechanical, and would rather connect it with some physiological sympathy existing between the skin and serous membrane of the chest. Pleurisy is often found to depend upon a certain *intemperies* of the atmosphere, which causes an epidemic spread of the disease; and like all epidemics, it then assumes a less sthenic type than isolated sporadic cases do; in this modification of the disease, the digestive apparatus is much deranged, and hence it has been designated *bilious pleurisy*. Metastasis of gout or rheumatism, or a repressed cutaneous eruption, may be the exciting causes of acute pleurisy. Pneumonia, by an extension of inflammation, so often induces pleurisy, that, as we before observed, it was long thought that they could not exist independent of each other. While pathology has controverted this error, it has shown us that pneumonia more frequently produces pleurisy than pleurisy produces pneumonia.

Pleurisy is said to be *latent* when it exists unannounced by the ordinary symptoms which usually accompany it, such as pain of the side, hurried respiration, dry cough, &c. We have observed pleurisy supervene in this insidious way

* We have seen a fatal case of pleurisy produced by perforation of the pleura in passing the needle round the subclavian artery for the cure of aneurism of this artery.

in the convalescence from fever: the patient, after having made some advance towards recovery, is observed to fall back again; he makes no complaint of his chest; still on careful examination we observe a slight hurry of the respiration, and hear an occasional dry cough; these direct our attention to the chest, where we find unequivocal evidence of pleurisy with effusion.

Complications of Acute Pleurisy with other diseases.—We may premise that acute pleurisy is much oftener simple and uncomplicated than chronic pleurisy. The frequency of the coincidence of acute pleurisy and pneumonia (*pleuropneumonia*) claims the first place in the enumeration of the complications of acute pleurisy. The pneumonia may be either the cause of the pleurisy, or it may be the consequence of it; or these two diseases may commence at the same moment, being the independent effects of the same morbid impression. In general, in pneumonia, when the inflammation reaches the surface of the lung, the contiguous portion of the pleura becomes inflamed, and is coated with a layer of lymph, usually thin, and often an exact measure of the extent of the inflammation of the lung. When the entire lung becomes hepatized, we have often observed the whole investing serous membrane covered with a more or less dense false membrane, marked with parallel lines produced by the impression of the ribs upon it. This complication exhibits the most common case of what has been termed *dry pleurisy*. We need hardly observe that the pleurisy here is of very subordinate importance: it is that, however, of which the diagnosis would embarrass us most, had we not seen the case at its commencement. The pressure of the effused fluid may have the effect of exciting inflammation in the lung: the ordinary stethoscopic phenomena will disclose this complication. The inflammation seldom goes beyond the first stage of pneumonia; and from the repeated opportunities we have had of examining the bodies of those who died with pleuritic effusion, and the few specimens we have seen of pneumonia in the compressed lung, we believe this complication to be very rare, and suspect that the carnified condition of the lung has been not unfrequently mistaken for the first stage of pneumonia. Laennec remarks that the pressure of the fluid has rather the effect of placing the lung out of the pale of inflammation. The third complication, or pleuropneumonia properly so called, in which the proper tissue of the lung and its investing membrane are simultaneously affected, is recognised by its exhibiting the stethoscopic phenomena peculiar to each lesion. The case is not very much aggravated by the complication; Laennec even considers the danger less than if either existed alone in a more considerable degree; for he is of opinion, as we above stated, that the pressure of the fluid controls the pneumonia, and that, in return, the absorption of the effused fluid is promoted by its being compressed between the unyielding solidified lung and the sides of the chest. This is a case in which the fluid is interposed between the lung and the side of the chest, in consequence of the lung, from its increased density, not admitting of displacement.

We have before adverted to the frequency of the complication of pleurisy and tubercles in the lungs, in which case there generally existed adhesions between the pleuræ pulmonalis and costalis. However, it will happen that, in some instances, nature will seem as it were to neglect the precaution of establishing an adhesion between the opposite serous surfaces; and softened tubercles situated near the surface of the lung will, in obedience to the pathological principles of purulent matter seeking the easiest and shortest outlet, perforate the pleura, and immediately give rise to a most intense pleurisy, marked by a very acute pain of the side, most distressing difficulty of breathing, and extreme anxiety. When we come to examine the chest, we find all the physical signs which characterize pneumothorax with effusion, (vide Pneumothorax,) in which case we know the lesion to consist of pleurisy and a tubercular cavity into which a bronchial tube opens. It may happen that the softened tubercle perforating the pleura will only give rise to simple pleurisy, in consequence of its not communicating with a bronchial tube.

Gangrenous ulceration of the lung and pleura will cause either pneumothorax or pleurisy; in addition to their respective signs, the sputa and breath have an insupportable fetor.

Pleurisy of one side is not unfrequently complicated with some disease of the opposite lung, arising out of the increased duty that has devolved upon it. This lung may either become emphysematous, or the subject of bronchitis or pneumonia. It is frequently attacked with sudden congestion, which produces most urgent sense of suffocation, and renders the patient's situation truly pitiable. We have before alluded to the fact that when pleurisy of one side exists, it seldom involves the pleura of the opposite side, but leads either to pneumonia or bronchitis; and when pleurisy is double, there is a fair start between both sides, and their affections proceed *pari passu*.

Prognosis of Acute Pleurisy.—Pleurisy is ever a serious disease; in many cases, however, it terminates favourably. The danger is proportionate, 1st, to the cause upon which the disease depends: when it depends upon ulceration of a tubercle, or upon superficial gangrene of the lung, it is always fatal: 2d, to the extent of the inflammation: double pleurisy is attended with more danger than when the disease is confined to one side; and when the whole cavity of the pleura is inflamed, the prognosis is more unfavourable than when only part of it is affected: 3d, to the quantity and nature of the effusion: 4th, to the time during which the effusion has existed: 5th, to the diseases which complicate the inflammation of the pleura, or which exist along with it.

Previously to noticing the treatment of acute pleurisy, we shall give the history of the disease in a chronic state.

II. Chronic Pleurisy.—There are two distinct kinds of chronic pleurisy: one, the continuation, as it were, of the disease in its acute form; the other, to use the usual but paradoxical question, chronic from its commencement; that is to say, at no period exhibiting either the intense fever, the acute pain, or energy of reaction which characterize an acute disease. When the diag-

nosis of diseases of the chest was less certain than it has been since the acquisition of the stethoscope, the first form of chronic pleurisy was much more common than it is at present, for this reason,—that formerly being without the means of appreciating the physical signs of the disease, when the pain, the most prominent symptom, had yielded to antiphlogistic means, it was then conceived that the inflammation was subdued and the cure complete; the patient then returning to his former diet and resuming his usual occupations, was often surprised by an attack more violent than the former. Our improved mode of examination teaches us that every symptom of inflammation may have disappeared, every function apparently be restored to its natural condition, and still there may be considerable effusion into the cavity of the chest: until this be entirely removed, we never can feel secure about our patient. Pleurisy, in its essential chronic form, creeps on very insidiously, without much acceleration of pulse or heat of skin; and when there is any *unusual* sensation in the side, it does not amount to more than a mere soreness: the difficulty or hurry of breathing is sometimes so inconsiderable as not to attract the individual's attention. An observer is struck with the patient's unhealthy pallid appearance; there is a loss of appetite and a languid look, which emphatically tells us of some mischief going on; on close examination we find that the absence of fever is not constant, but that towards evening there is a febrile movement. A dry cough, or one attended with scanty mucous expectoration, and which has existed a considerable time without any apparent dependence either upon crude tubercles in the lungs or upon gastro-intestinal irritation, should lead us to suspect the possibility of chronic pleurisy.

The anatomical characters of chronic pleurisy do not differ very widely from those of the acute form, especially when it has been a mere transition of one form of the disease into the other. In this latter case, no matter to how distant a period the disease may be protracted, the fluid effused retains to the last its primitive character. As in acute pleurisy, it is a straw-coloured serum, but more consistent, apparently owing to its holding in suspension a considerable portion of the fragments of the false membrane, which, on the fluid settling, sink to the bottom. These condensed fragments, which, on opening the chest, are found in its most dependent parts, constitute, according to Laennec, a connecting link between the sero-purulent effusion and the false membrane. In essentially chronic pleurisy the effusion partakes more of a purulent character: in this case the disease closely resembles an abscess, the false membrane investing the pleura corresponding to the cyst, and endowed with the physiological properties of absorption and secretion. If the constitution be imbued with a scrofulous taint, (which is the habit in which we most frequently meet with this morbid condition,) the effusion will exhibit the ordinary characters of scrofulous pus, viz. a thin, whey-coloured matter, with flocculi of lymph floating in it. When the effusion is mainly purulent matter, mixed with a small proportion of serum, it is of a greenish colour, and very much resembles an effusion of tea to which a small proportion of milk has been added. The effusion in chronic pleurisy is not as exempt from smell as that in the acute disease.

The false membrane in chronic pleurisy is not essentially different from that in acute pleurisy; it is only firmer and more condensed, owing, perhaps, to the longer time it has been under the pressure of the effused fluid. It is capable of all the transformations of which we stated it to be susceptible in acute pleurisy; and to its conversion into fibro-cartilage, Laennec ascribes a particular change in the configuration of the chest, to which we shall presently have occasion to advert. It is more prone than in acute pleurisy to become the matrix of morbid developments, especially tubercle.

The lung is more compressed than in acute pleurisy; it is often reduced to a thin lamina, not exceeding six lines in thickness, lying down along the spine. There is also a more complete annihilation of its vesicular structure. It was this condition of the organ that led less careful examiners to pronounce upon its entire removal. Tubercles or other morbid growths may develop themselves in it, and, undergoing their proper changes, modify the symptoms of the original disorder.

Diagnosis of Chronic Pleurisy. — The physical signs of chronic pleurisy differ little from those of acute, except in being more prominently expressed; and apparently for this reason,—that the disease, from its insidious character, has excited little constitutional alarm, and therefore the individual labouring under it has unconsciously permitted it to go on without seeking medical relief. In general, then, when it presents itself to the physician it has existed for a considerable time. The affected side is more rounded; the intercostal spaces are more dilated, and raised above their natural level, in some cases admitting of fluctuation being felt; the integuments of the side often become œdematous. When the disease has existed for a long time, the spine is observed to deviate from its natural direction, and to form a curve with its cavity looking towards the affected side. If the left side be the seat of the effusion, the heart undergoes the same displacement as in acute pleurisy.

The œdematous state of the integuments lessens, at least, the value of percussion as a means of assisting our diagnosis. There is not only a more complete absence of respiratory murmur, but not even ægophony or bronchial respiration is present. Double chronic pleurisy is a very rare form of disease.

Partial or circumscribed chronic pleurisy is more frequently met with than the same modification of acute pleurisy; and although there are many circumstances connected with it calculated to embarrass the diagnosis between it and pneumonia, especially our seldom having an opportunity of observing it *ab initio*, still the marked expression of the physical signs seldom leaves us at fault. It sometimes happens that the circumscribed nature of the affection shows itself to the eye by a distinct line of demarcation intersecting the side of the chest. If it happens that the pleurisy occupies the inferior part of the side, (which is most frequently the case,) below this

line will be found the physical signs of pleurisy, with dulness of sound and absence of respiration; while above it, the only deviation from the ordinary state of things is puerile respiration.

Pleurisy assuming a chronic character from its commencement generally occurs in a cachectic habit of body, or where the health has been broken down by previous illness. We have met with it more than once after fever, and usually either in scrofulous habits, or in persons much addicted to intemperance.

Prognosis of Chronic Pleurisy. — The prognosis of chronic pleurisy is, generally speaking, very unpromising; however, if it exist as an isolated affection, apart from any complication, it may go on for months, nay, for years. If, as is often the case, tubercles form and go through their changes either in the compressed or in the opposite lung, the complication will have the effect of precipitating the fatal termination. In the ordinary course of the disease, a slow, wasting fever sets in; there is a gradual emaciation; the appetite fails; the pulse is languid, although not much quickened; the legs swell, and the face becomes puffed; the expectoration often has a disagreeable alliaceous smell. Upon these symptoms well-defined hectic fever soon supervenes, and rapidly wears down the patient.

Nature often takes the cure of pleurisy into her own hands, and seeks to relieve herself of the fluid effused into the chest in one of the following ways: 1, by absorption; or, 2, when the fluid is purulent, by making a passage for it through the pulmonary tissue into a bronchial tube, from whence it is expectorated; or though the walls of the chest, from whence it flows immediately out; or in some cases she adopts these two last ways at the same moment.

When the disease has existed a long time, and nature at length takes upon herself a slow, gradual process of absorption, which she takes a considerable time to complete, we observe that remarkable change in the form of the side to which we before made allusion: this side, which was before perceptibly longer than the opposite one, now becomes less; it is diminished in all its diameters, its circumference sometimes measuring less by an inch than that of the opposite side. Its length is not less encroached upon; the ribs are approximated, the shoulder becomes lower, and even the spine, in some cases, assumes a lateral inclination from the habitually bent position of the patient. The muscles of the chest, especially the great pectoral, seem to have lost half their volume. We shall easily comprehend the nature of this change, when we reflect upon the cause upon which it depends. Laennec, who was the first to notice it, charged it upon the fibro-cartilaginous nature of the false membrane, which continued to oppose itself to the lung's being restored to its original condition: it interfered with its vesicular texture so as to render it impervious to the air: the organ had, in fact, virtually undergone a change of dimensions, in consequence of which the relation between it and its containing cavity was lost. The atmospheric pressure acting upon the side, and not counterpoised from within, causes it, as it were, to fall in and accommodate itself to the altered condition of the lung. We cease to wonder that the unyielding bony case should have its form influenced by this condition of the lung, when we reflect how speedily an opposite state, or dilatation, will succeed to an emphysematous condition of the contained organ. A cause mainly instrumental in the contraction of the side is the atrophy of the muscles from disease, respiration being exclusively carried on by the opposite side.

When nature relieves herself of the accumulated fluid by a passage through the pulmonary tissue into a bronchial tube, the individual, who has been for some time labouring under either a dry cough, or one attended with scanty discharge, is suddenly seized with an abundant expectoration of greenish, purulent matter, which comes forth with such a gush as to appear to be vomited rather than expectorated. The discharge from the lungs continues from day to day, the quantity gradually diminishing till it ceases altogether. In proportion as the matter is discharged, we perceive the fulness of the side to give way, and to come down to its normal dimensions. In this case a considerable time will elapse before percussion and auscultation yield their natural results, the sound continuing dull, and respiration feeble; still the function of the lung will ultimately be restored, differing from the case of contraction of the side, in which the dull sound and feeble respiration are permanent.

The third expedient which nature adopts for the discharge of the purulent fluid in the chest is to give the pleurisy the character of an abscess, making its way through the walls of the chest, and pointing externally. When the apparently small abscess on the side of the chest either opens spontaneously, or is opened by art, it discharges a quantity of matter quite disproportionate to its size, and this matter is pumped out at each expiration and cough. Sometimes the matter gets vent both through a bronchial tube and through the side of the chest at the same time. It is a singular fact, that when the fluid in the chest is discharged through the lung, and consequently through a communication established between a bronchial tube and the cavity of the pleura, pneumothorax does not ensue, although it is previously the same lesion that gives rise to this morbid phenomenon; the difference being only in the mode in which this lesion takes place.

Treatment of Pleurisy.—If the energy and activity of our practice in the phlegmasiæ should be in proportion to the importance of the part inflamed, there is scarcely any part in the whole animal machine in which the inflammation demands a more decided and uncompromising plan of treatment than the pleura. If we temporize in the treatment of pleurisy, the least evil we can anticipate is a protracted convalescence; whereas if we meet it, *in limine*, with vigour, we often, as it were, strangle it in the birth.

I. **Treatment of Acute Pleurisy.** — The treatment of acute pleurisy comprises all the means usually employed to reduce constitutional fever and local inflammation.

Bloodletting.—In the first stage of the disease, when febrile excitement runs high, and is accompanied with much local distress, we should bleed with an unsparing hand from a large orifice, and in the manner most calculated to make the speed

iest impression upon the system. Should a single bleeding, conducted in this way, fail to afford very decided relief, we should resort to the operation again within a few hours, and repeat it at more or less distant intervals, according to the urgency of the symptoms and the capability of our patient to bear further loss of blood. Some have attempted to fix the precise quantity of blood to be drawn in the cure of a pleurisy; a generalization to which nature will not submit, the effects of bleeding differing in different individuals. It would be to trust to a very fallible guide, indeed, were we to depend upon the indications of *the pulse*. In this, as well as in the inflammation of all other serous membranes, the pulse, so to speak, as often underrates as exaggerates the extent of the mischief, being rather a measure of the constitutional irritability of the individual than of the actual amount of disease. The usually accompanying *pain* is a symptom upon which we can place more reliance, and the effects produced upon it serve, in some measure, to guide us as to the extent of depletion; but even it, so far from being proportionate to the extent or intensity of the inflammation, is often absent when the inflammation occupies a considerable extent of surface; and even when both sides are affected at the same moment, if it be present, it is often found not to amount to more than a mere soreness. The *dyspnœa*, or rather the nervous dread of drawing in a full breath, in many cases lasts for so short a time, that we must see the patient in the first moments of the attack to have the value of this symptom. Were we to lay down any general rule, deduced from the common symptoms, as to the limit to which we would carry sanguineous depletion, we should be most disposed to regulate this by the strength of the patient, and the relief of the pain and consequent power of taking in a full inspiration.

While we distrust the indications of the pulse, which, in some cases, from its composure, is calculated to mislead us as to the expediency or necessity of bleeding, so we should be equally on our guard not to be betrayed into the opposite error of considering an accelerated pulse, which may be produced by the depletion we have employed, as the index of continuing inflammation, and be thus led to push depletion still farther, and thereby originate functional disorder ultimately terminating in organic disease of the heart. We have seen this mistake so often committed, that we deem it necessary to subjoin this caution.

While we employ general bleeding, we may at the same time seek to relieve the local congestion by cupping and leeching. In the necessarily protracted operation of topical bleeding, we should manage it with caution, so as not to run the risk of exposing our patient to cold. Venesection does not seem to be equally applicable to every modification of pleurisy. Thus, when it prevails as an epidemic, or develops itself in the progress of fever, or occurs as a puerperal disease,—in all these instances it assumes an asthenic type, when it becomes very questionable if general bleeding be at all admissible, or if we should not rather confine ourselves to local bleeding, with such other resources as art affords. This at least is certain, that in these cases bleeding should be employed with extreme caution. In circumscribed pleurisy, with which the constitution does not seem to sympathise, the application of a few leeches to the seat of the pain will often remove all uneasiness. If, as in phthisis, in which partial pleurisy is so common, the exhausted state of our patient will not bear even so small an abstraction of blood, the temporary application of a hot turpentine stupe will often answer our wishes.

Purgatives.—The saline purgatives are especially suited to this first stage of pleurisy, as they diminish the mass of the circulating fluid by greatly increasing the secretion of the intestinal mucous surface. We follow up this antiphlogistic treatment by other means calculated to reduce fever, by producing diaphoresis, or otherwise, viz. the different preparations of antimony, tartar-emetic in very minute doses, James's powder, Dover's powder, &c.

Sedatives.—These are often very useful in quieting the irritation of the cough, and thus procuring the repose of the organ affected. With such a view we derive much benefit from the use of hyoscyamus, conium, lactucarium, &c. Some recommend the use of opium in large doses after bleeding, by which we continue, as it were, the sedative impression of the bleeding, as well as allay the irritation produced by the pain, and soothe the cough.

Mercury.—The combination of calomel and opium enjoys an established celebrity in the inflammations of serous membranes; and after the use of venesection, and where there exists much pain, the remedy is invaluable. In such cases, our object is to bring the system as speedily as possible under the influence of mercury, by which we as it were supersede the morbid action which is going forward.

The treatment which we have just laid down applies to the earliest stage of pleurisy. However, it often happens that the patient does not present himself till the disease has existed at least for some days, and the intensity of the symptoms has in some degree abated, when the inflammation has assumed rather a subacute character, and has partly terminated in effusion. It is now that we have most reason to complain of the pulse not intimating to us the extent of the mischief. We now come to the long agitated question,—how late in the progress of pleurisy are we warranted in using the lancet? Without attempting to lay down a general rule upon the point, we would say that even now, notwithstanding the tranquillity of the pulse which often exists, we expect decided advantage from bleeding, inasmuch as we thereby, 1. check the further effusion of fluid; 2. promote the removal of the fluid already effused, by increasing the powers of the absorbing system at the expense of the circulation; 3. render the system more susceptible of the influence of the medicines we employ.

When the inflammation has nearly subsided, and the acute pain given way to a mere sensation of soreness, and we have the physical evidences of effusion, the indications of cure now are different, our main object being to promote the removal of the effused fluid. The means we employ for this purpose are either internal or external; the former comprising those medicines which,

acting by way of derivation either upon the kidneys or bowels, thus indirectly affect the effusion; the latter comprehending the different modifications of counter-irritation, which, by stimulating the absorbents, tend to produce the same effect more directly.

Diuretics.—The popular combination of squill, digitalis, and calomel, produces as speedy a diuretic effect as any we can employ. Laennec speaks highly of the infusion of digitalis from experience of its value in the particular case under consideration. It recommends itself to our notice upon the double grounds of its diuretic property and the control it exercises over the circulation; an important recommendation, when we consider the proximity of the organ affected to the source of the circulation, and the advantage from the blood being driven into it with diminished impetus. We may also employ, separately or in conjunction with the above, the saline diuretics, viz. the nitrate, acetate, and bitartrate of potash.

Purgatives.—If the strength of the patient will permit, we may make use of the hydragogue cathartics, viz. elaterium, jalap, scammony, camboge, &c.; but the operation of these medicines is attended with so much exhaustion, that we can only employ them occasionally.

Diaphoretic medicines afford us such very feeble assistance at this stage of the disease, that they scarcely deserve a place among our remedial agents. We have not found tartar-emetic to sustain its character of an active antiphlogistic agent in uncomplicated acute pleurisy; but when the lung is involved in the same inflammation, we then find the advantage of associating it with our remedies.

When we are endeavouring to affect the system with mercury administered internally, we may at the same time employ mercurial friction on the side, by which we assist the internal exhibition of the mineral, while we stimulate the absorbents.

Stimulating liniments carry with them the advantages that we can regulate their irritating property *ad libitum*, and that they do not unfit the surface to which they are applied for any future application.

When the milder counter-irritants, as auxiliaries to the internal means employed, have failed to make any impression upon the fluid, we resort to blisters. Andral's work (Sur les Maladies du Poitrine) abounds in cases in which the removal of the fluid seemed to date itself from the application of a blister. A succession of blisters acts more effectively than a single one of which the discharge is continued by an irritating application.

As long as fever and inflammation are present, we of course insist upon rigid abstinence. But when these have subsided, and have left their effects alone behind them, the reasons for continuing the same strict system are scarcely less cogent; for in this way we lower the circulation, and thus establish a physiological ratio between its powers and those of the absorbing system, whereby the latter are much increased, and act with much more avidity upon the fluid in the chest. We find it extremely difficult to carry this part of our treatment into effect; for our patient will regain a degree of health, and feel very little if any inconvenience from the fluid in the chest, and not being able to reconcile our severe restrictions with his sensible amendment, will become impatient of restraint, and, yielding to his improved appetite, will in all probability bring on fresh inflammation.

Sometimes a considerable time will elapse before any impression is made on the fluid, the system seeming as it were to stand out against the operation of our remedial agents up to a certain point, and then suddenly yielding, its removal rapidly ensues. At other times our medicines begin to take effect quickly, and remove the fluid gradually. We recognise the effects of our remedies by the side losing its fulness, by the reappearance of ægophony,* by the return of the respiratory murmur and clear sound to situations where we before sought them in vain. Percussion will continue to yield a dull sound for a considerable time after the return of the respiratory murmur.

It seldom happens that in acute pleurisy we have to resort to the operation of *paracentesis thoracis;* nor should we ever think of it as long as we have any prospect of removing the fluid otherwise; still it may happen, from the other lung becoming affected either with bronchitis or pneumonia, or from having been already emphysematous, that to relieve the urgent sense of suffocation we have no alternative. In almost all these cases we find the operation to be attended with no more than a mere temporary relief, the fluid soon collecting again. It is an ascertained fact that the operation is, in general, less successful in acute than in chronic pleurisy, the reasons for which we shall endeavour to explain when we come to speak of the treatment applicable to the latter form of the disease.

I. **Treatment of Chronic Pleurisy.** — The treatment of chronic pleurisy, or of that modification of the disease which from its commencement exhibits some of the characteristics of an acute inflammation, is as different from that of acute pleurisy as the respective natures of the two forms of the disease. Antiphlogistic means, whose activity is measured by the intensity of the febrile symptoms and the strength of the individual, constitute the treatment of acute pleurisy; and amongst these means, bleeding, as we have seen, occupies a most prominent place. In essentially chronic pleurisy, we seldom, if ever, have occasion to resort to constitutional bleeding. The weakened, if not the vitiated habit of body in which it generally takes place, will not admit of the exhaustion which this operation would produce; even local bleeding must be employed with considerable caution. The indications of cure are, to remove the fluid from the cavity of the chest, and to improve the dilapidated state of the system. The means by which we try to promote the removal of the fluid may be divided into constitutional and local; the former comprising those agents whose action is directed to some organ or set of organs at a distance from the seat of disease, and which effect the object we contemplate by establishing a counter-irritation and increased secretion at the expense of the diseased secretion, which continues to take

* This effect was ascribed by Laennec to the transmission of the voice through a diminished stratum of fluid; but we consider it to be rather due to a less compressed state of the lung from the diminution of the compressing fluid.

place into the chest until it is as it were superseded.

Most of the means which we adverted to as applicable to the stage of acute pleurisy when effusion has taken place, may be seasonably employed in chronic pleurisy, qualified alone by the consideration that in the latter form of the disease the habit of body in general is not such as will bear the operation of active medical agents. When we employ mercury, we must manage its exhibition with caution, and beware lest, in pushing its use too far, we give rise to an irritative fever, which would soon exhaust the weakened constitution in which this modification of pleurisy usually presents itself: we should content ourselves with slightly affecting the gums. When hectic symptoms show themselves, we should cautiously abstain from the use of mercury altogether. We employ the same diuretics as in the second stage of acute pleurisy. We cannot, without incurring the risk of weakening our patient too much, resort to active purgation; we must, therefore, be satisfied with the mildest medicines of this class, and those whose operation draws least upon the stamina, viz. castor oil, manna, &c. Diaphoretic medicines lend us more aid in this than in the second stage of acute pleurisy; for instance, Dover's powder, James's powder, &c.

Constitutional means or internal medicines, we must in candour admit, do not assist very much in the removal of the fluid.

[Iodine has been highly extolled, employed both internally and externally. Dr. Stokes (*Op. cit.*) advises, that Lugol's solution should be taken freely; and that from a quarter to half an ounce of the compound iodine ointment should be rubbed daily over the side. By others, the use of iodide of potassium is preferred, and, in more asthenic cases, iodide of iron.]

The external applications, and upon which we place our principal reliance, comprehend the different modifications of counter-irritation, viz. blisters, setons, issues, stimulating liniments, &c. Blisters are unequivocally the means most calculated to promote the absorption of the fluid secreted into the chest, as well as to interfere with its further secretion. We employ a blister commensurate with the extent of surface involved in the inflammation, and repeat its application in preference to keeping the blistered surface open by means of irritating substances, each repetition having as it were the effect of renewing the counter-irritation.

The next part of the treatment of chronic pleurisy regards the improvement of the habit of body and relief of the constitutional symptoms which most commonly accompany this form of the disease. We are not obliged to prescribe the same restricted diet as in acute pleurisy, but would admit a certain latitude, always taking care to avoid such substances as are calculated to produce febrile excitement, and consequent acceleration of the circulation; for, as we before observed, the powers of absorption and circulation observe an inverse ratio, and as we require the efforts of the former to remove the fluid, we should defeat our object did we not observe this caution. It is, besides, an object of importance that as little blood as possible should be transmitted through the lung lying under the pressure of the fluid. In many cases chronic pleurisy is attended with such slight constitutional symptoms as scarcely to deserve to be considered more than a local disease; still in most instances hectic fever sooner or later sets in. At this stage of the disease, change of air is productive of the most decided benefit, often effecting an almost instantaneous amelioration in the symptoms: the night perspirations cease, the appetite improves, and sleep becomes refreshing. In the exhibition of tonics we have had reason to prefer the infusion or decoction of bark, combined with sulphuric acid, to the more concentrated sulphate of quinine. We have found much advantage, in these and similar cases, from the mineral acids in decoction of Iceland moss. When our curative means take effect, we recognise their success by the physical signs of the disease gradually disappearing; by the side losing its fulness; by the intercostal spaces sinking down to their ordinary level, and being less dilated; and by the return of a feeble respiratory murmur, and a less dull sound on percussion; and, in case of the left side having been the seat of the disease, by the heart's pulsation being felt in their normal situation; and by the liver ceasing to be felt below the margin of the right false ribs when the disease has occupied this side. But when, instead of these evidences of the efficacy of our means, we find the fluid to increase, and all the sensible signs of the disease more marked, and in consequence the dyspnœa more distressing, the operation of tapping the chest is our last and only resource. We must confess that the results that have usually attended this operation are far from being calculated to inspire us with encouraging anticipations, (see Empyema;) still even the few cases in which either complete recovery or relief for a considerable time has followed it, prevent us from despairing. It is impossible to judge what might be the event were the operation undertaken earlier; this must be a matter of conjecture, as we must ever look upon an operation, the unavoidable consequence of which is the admission of air into the inflamed cavity of the chest, as a serious matter, and only warranted by the failure of other means to produce the object we desire. We have similar effects produced in chronic abscesses when opened. As long as they had no communication with the air, so long they produced no constitutional disturbance; but no sooner is the air admitted than hectic symptoms quickly supervene. The cavity of the chest affected with chronic inflammation resembles a chronic abscess, both in its physiological and pathological conditions. The failure of success of the operation for empyema may be ascribed to the following causes;—to the irritative fever which often follows immediately upon the operation; or to the condition of the lung, occupied by tubercles in different stages, and giving rise to constitutional symptoms; or to the lung having been so long pressed upon by the fluid as to render its natural elasticity quite irrecoverable. We have before observed that the operation, undertaken under the most auspicious circumstances, is not exempt from a certain share of danger.

[It must be borne in mind, too, that twenty cases of complete and permanent recovery from empyema, by absorption, have been recorded by

one author, Dr. Stokes (*Op. cit.* p. 481), so that, as he properly remarks, the probability of a cure, and the efficacy of remedies, is much greater than has been supposed.]

We now come to consider if there be any case so hopeless and desperate that we can promise ourselves no advantage from the operation: if such case there be, it is when there is extensive tubercular development in the compressed lung; but even here Laennec does not hesitate to recommend the operation, from his conviction of the curability of phthisis even when there exists unequivocal evidence of a cavity in the lung.

Mr. Crompton has had considerable experience of the operation for empyema and its results; and of ten cases upon which he has operated, three have been attended with complete success. After operation, his practice is to inject a weak solution of chloride of lime, which he finds to have the effect of diminishing the discharge and of correcting its character. (See Empyema.)

We have remarked that the operation of tapping the chest is more likely to be successful in chronic than in acute pleurisy; that is to say, if an untoward combination of circumstances demands operation in the early stage of acute pleurisy, such operation is more uncertain in its result than the same operation undertaken in chronic pleurisy at a period equally distant from its commencement. This fact, established by experience, we would account for in one of two ways; either that the constitution sympathises less, or suffers less irritation from the admission of air into the cavity of the chest, covered with a dense coating of lymph, as is the case in chronic pleurisy, than from letting in the same fluid upon the naked pleura unprovided with any such protection; or perhaps it may depend upon inferior susceptibility of inflammation in one case than in the other. In chronic pleurisy, the older the disease is, the less likely is the operation to be successful, because the more chance is there that the lung is disorganized; and the longer the lung has remained under pressure of the fluid, the less likely is it to recover its natural elasticity. The more circumscribed the pleurisy is, the more promising is the prospect of a successful operation.

For further information on the subject of the present article, we refer the reader to Empyema, Perforation, Pneumonia, and Pneumothorax.

Robert Law.

PLICA POLONICA, from *plico*, to knit together. This disease derives its name from the manner in which the hair is plaited or matted together, and, as its name also implies, is of most frequent occurrence in Poland. It has, however, been also observed in Tartary, among the Cossacks of Russia, in Hungary, and in a few instances in Switzerland and France. The people of Poland believe that it was carried into their country by the Tartars in the twelfth or thirteenth century. Schlegel, a physician practising in Moscow, who published a work on plica in 1806, gives a singular account of its origin. The Poles on the death of one of their kings, Miceslas II. in 1034, petitioned Pope Benedict the Ninth to release from his vows Casimir the son of Miceslas, who had entered into a convent of Benedictines in France; the request was granted on certain conditions, and one of the conditions required was, that from that time forward the men of Poland should keep their heads shaved. Casimir on his accession enforced the tonsure through all his dominions, and to the present day a part of the ceremony observed in assuming the national costume of Poland consists of shaving the head, a single tuft of hair being left to grow from the top of the scalp after the manner of the Tartar and some Indian tribes. The poorer inhabitants of Poland being wretchedly lodged and clothed, and exposed to the combined injurious influence of a marshy soil and a damp variable climate, the general cutaneous exhalation is at all times below the healthy standard, and the secretion from the scalp being still farther diminished by the custom of keeping the head shaved, there is, according to Schlegel, an increased compensating action thrown upon the bulbs of the hair which has been allowed to remain; and hence arises the greatly increased growth of this portion of the hair, and the unnatural quantity of viscid secretion which is at the same time thrown out.

The hair grows to a very unusual length, and being not only plaited but matted together by a viscid fatty secretion of an abominably fetid odour, resembling the stench of rancid fat, and in most instances crowded with vermin, presents an extremely disgusting picture of filth and disease. The hair of the scalp is that generally affected, but the disease is also seen in the axillæ, on the breast, and the pubes. In a few rare instances the nails are altered in their appearance, become livid or yellowish, long, and crooked, so as to resemble the talons of a bird of prey: this change is generally in the nails of the toes. The length which the hair sometimes attains is almost incredible. Cases are narrated of its reaching to the heels, of its being in such quantity and of such a length as to fall on the floor over all sides of the bed on which the patient lay. In the museum of Dresden there is a specimen preserved nine feet long. Not the least singular circumstance in the history of plica is the extraordinary attachment the Poles entertain for this dirty appendage. If the hair do not become spontaneously matted and filthy, the Poles spare no pains to make it so; the men put on dirty fur bonnets which have become coated with viscid secretion from being worn by others who laboured under the disease, or they interlace with their own hair masses of old plica steeped in beer! The women wear their hair very long, and, to encourage the growth of plica, refrain from combing it, and fasten it in knots, and make it adhere by glue or rosin. They will for years willingly suffer the greatest torture in carrying or dragging after them a mass of this matted hair, and beggars who are fortunate enough to possess a good plica cherish it with the greatest care as the most certain means of obtaining alms. In some parts of Poland the lower classes look upon plica as a special favour from Providence, which will preserve them from harm and sickness; in other parts it is viewed as an infliction coming from a malignant spirit, but not the less cherished, as it is then considered a protection from all other misfortunes. Lafontaine, a physician resident in Warsaw, who published a work on plica in 1792,

relates the case of a pregnant woman who had plica of four months growth on the pubes: during that period the urine was allowed to filter through the matted hair, and after labour commenced she could not be persuaded to permit the plica, which firmly resisted the protrusion of the child's head, to be incised, until her life was in the most imminent danger.

The prejudice in favour of plica is extended even to inferior animals. Horses presenting an appearance of the disease are valued beyond others, and hence the jockeys of Poland have learned to add another to the many arts practised by their brethren of other countries. It is said that in Poland, and in some parts of Russia, plica is occasionally observed in sheep, dogs, wolves, and foxes.

The physicians of Poland have not escaped the contagion of prejudice. Kerckhoff,* whose observations were made during the stay of the French army in Poland, relates a case illustrative of this. The patient, a boy of about fifteen years of age, complained of severe pains of his head. He lay in a most filthy state, and his black hair, knotted long and matted together, gave out an intolerable stench. The Polish physician in attendance strongly opposed Kerckhoff's suggestion of cutting off the hair, on the ground that the humour exuded on the hair might turn in on the brain and cause apoplexy. Kerckhoff entered into a compromise with the Polish doctor; and the hair was cut off in portions of two fingers' breadth at intervals of two and four days. In twenty days the whole scalp was cleared, and then, by simply keeping the head combed and washed, all the bad symptoms vanished.

Stories are related by some writers of the disease appearing very suddenly, and the hair preserving for years the particular form of dressing it possessed at the time of the seizure. These stories are, however, treated as fables by the best informed authors; and a statement generally made and believed in Poland, that the long hairs of plica are acutely sensible, and are the seat of great pain when touched, is equally void of foundation. In some instances the bulbs of the hair and the scalp are very sensible, owing to irritation, and pulling the hair ever so slightly gives acute pain; but Larrey and all modern observers positively assert that the hair may be cut at any part without causing the slightest pain, provided it be done without dragging the bulbs.

Pathology.—On the nature of plica the most opposite opinions are entertained. By some it is pronounced as a disease "sui generis," having its seat essentially in the bulbs of the hair, and requiring very cautious treatment. Others as stoutly assert that plica is merely the product of neglect and dirt, and that it requires for cure nothing but the shears and cleanliness. This difference of opinion is not alone between foreign observers and the physicians of Poland, but the latter themselves are divided on the question. Among those who hold the first opinion are Lafontaine, who asserts that he saw the disease in a new-born infant, and Robin, surgeon to Frederick the Great, who relates the following experiment. He shaved the heads of two boys on whom the disease was just beginning to appear, and then paid particular attention to the hair during its growth. His attention was in vain, for the disease re-appeared. Schlegel agrees with Lafontaine and Robin; and more lately among foreign physicians, Chaumeton and Mouton, who were attached to the French army when in Poland during the late war, hold the same opinion. It is further argued in support of their view, that if plica owed its origin merely to want of cleanliness, it would not be confined to Poland, but should be equally found among the Russian, Prussian, and Spanish peasants, who are as dirty in their habits as the lower classes of Poland; that its appearance frequently constitutes the marked crisis of some other disease; that it is accompanied with a peculiar secretion; that the nails, which are known to be merely a variety of the same tissue as the hair, are in bad cases engaged by a similar diseased action; and that the bulbs of the hair exude a peculiar viscid secretion, and are found swollen and acutely sensible. In conclusion, it is asserted that plica cannot be suddenly removed without great danger to the patient. On the other hand, Davidson, a Scotchman, who was physician to one of the kings of Poland, published a work in 1668, in which he pithily observes of the disease, "Nullus habet, nisi qui non velit carere," and declares that he treated and cured more than 10,000 cases; that he always, without hesitation, cut off the plicæ, and that no injurious consequences supervened. Larrey, Chamsern, Gase, Kerckhoff, &c., who had opportunities during the late war of investigating the disease in Poland, support the opinion promulgated so many years since by Davidson, and assert with him that the fear entertained of cutting off plica is a mere chimera. In support of their opinions they point to the facts, that Polish recruits are always cured by their hair being cut and their habits changed after their entrance into the army; that the disease is almost invariably confined to the lowest classes, and principally to the Jews, who form an immense proportion of the population of Poland, and are universally acknowledged to be the filthiest people on the face of the earth. They further state that strangers residing in Poland never contract the disease unless they sink so low as to approximate to the natives in manners and dirt, and that the disease is disappearing just in proportion as improved habits and comforts are extending; moreover, that in cutting off a plica, as in the case related by Kerckhoff, and which we have already noticed, the agglutinated hair is found distinct and round at the roots. To the last argument it is replied, and with justice, that the diseased action which produced the plica having ceased, the hair which has continued to grow will after a little time have pushed out from the scalp the agglutinated mass of hair, and hence that the soundness of the hair at the roots is no proof that diseased action had not previously existed. Larrey is further of opinion that the urgent symptoms, as pains in the bones, joints, &c., which occasionally precede or accompany plica, owe their origin to a complication of syphilis. Jourdan, the translator of Schlegel and Lafon-

* Observations Médicales par Jos. Rom. Louis Kerckhoff, Doctor en Médecine—Médecin de l'Armée des Pays Bas, &c. Published in vol. vi. of Medical Transactions of College of Physicians in London.

taine's works, and the writer of the article "Plique" in the Dictionnaire des Sciences Médicales, suggests that there should be a distinction made of plica into true and false; true plica being that form of the disease described by Schlegel, in which the bulbs of the hair are inflamed, become enlarged and acutely sensible, produce a rapid growth of hair, and at the same time glue it together by a peculiar secretion which is poured out from the skin and the hairy bulbs, and even forces its way through the substance of the hair near the skin. False plica Jourdan considers as a mere accidental matting of the hair, dependent altogether on external causes. This view would probably reconcile many of the conflicting statements, but even in our investigation of the nature of what, according to this classification, we may call true plica, we meet with great difficulties. We have not information before us sufficiently accurate to enable us to say what is the precise source of the fetid secretion which glues the hairs together, —whether it is poured out by the bulbs of the hair, the sebaceous follicles, or the general surface of the skin. The surface of the skin where the hair is affected is described as being in a state of ulceration in some cases, but this may be an effect of the state of the hair rather than a cause of it; and finally, the state of the scalp may, for aught that we yet know, arise from the presence of some ordinary eruption, the matting of the hair and the viscid fetid secretion being complications added by the influence of extraneous circumstances. Lafontaine asserts that hair presenting shades of red is more liable to plica than hair of other colours, but Schlegel states that he never observed any difference of liability arising from colour.

Alibert makes three subdivisions of plica, according to the form it may chance to assume. He calls his first species "plique multiforme," where the hairs form a great number of ropes, hanging round the patient's face like serpents round the Gorgon's head; his second species, "plique à queue, ou solitaire," in which the whole hair is united into one long plica or tail, principally met with among females, and on those wearing their hair after the national Polish fashion. He calls his third species "plique en masse, ou larvée," in which the hair is all melted into one cake, covering the head like a helmet. These subdivisions are, however, useless; for the varied forms which the hair assumes, appear to be merely the result of external accidental circumstance.

The people of Poland believe that plica is contagious, but there does not appear to be satisfactory ground for this belief. Kerckhoff inoculated children and himself with the viscid secretion, and failed to propagate the disease; and Davidson, who had ample experience, is also a disbeliever in its contagion. Alibert, on Robin's authority, states that a Polish nobleman who kept a seraglio, of which four of the inmates had plica, never contracted the disease. On the other side, Lafontaine and some of the French observers of plica believe that it is a contagious disease.

Symptoms.—The premonitory symptoms of an attack of plica, according to those who look upon it as a peculiar disease, are pains in the back and limbs, vertigo, lachrymation, with violent itching sensation of pricking, and increased sensibility of the hairy scalp, followed by a copious secretion of a peculiar viscid sweat, of the consistence of honey, which speedily glues the hairs together. On the appearance of this secretion, the previous symptoms disappear. It is said in Poland that one of the most usual forerunners of an attack of the disease is a perverted appetite, and hence there is a saying, "Sæpe sub plica, latet seu fœtus seu plica." Of all the symptoms, however, none give a certainty of the approach of the disease except the breaking out of the viscid sweat. Cases are given by Alibert, Lafontaine, Schlegel, &c., of plica appearing as a crisis of, or alternating with internal diseases; according to their accounts, the internal affection was alleviated when the plica secretion was abundant, and *vice versâ*. When the hair is cut very close, in what we may call true plica, a brownish fluid frequently exudes from the bulbs of the hair, and the appearance of this fluid has given rise to the belief that the hair poured out blood.

Treatment.—The directions for treatment, of course, vary as much as the opinions on the nature of the disease; those who look upon the disease as the product of dirt, directing us to cut off at once without dread the matted mass, and afterwards trust for a cure to soap and combing; and on the other hand, those who see in the cutaneous affection the elimination from the system of a poison, which they call "virus trichomaticus," warn us in the strongest language not to meddle, lest we turn the poison back on the brain or lungs, &c. Lafontaine extends the supposition of the existence of a peculiar virus so far as to direct us, when any symptoms appear which we suspect are premonitory of the approach of plica, to hasten its appearance by warm cataplasms, sinapisms, &c. to the scalp. Under whatever view we regard the disease, the supposition of the existence of a virus is a mere assumption, and the advice to force the eruption is only an illustration of the prevalence of the same bad principle which of old so erroneously directed us to force out the virus of other eruptive diseases, as small-pox or measles. Mouton, to whose opinions we have already alluded, says we may without fear cut off plica if it be dry, and if it be united to the scalp by hair sound near the roots, which he says indicates that the diseased action which had produced the plica had ceased; but that we ought not to interfere as long as the bulbs of the hair are inflamed and sensible, and continue to pour out a viscid secretion, keeping the hair matted at its roots. Various remedies are recommended in Poland. Lycopodium is much used by the people, who use it both as an external application and an internal medicine; but there does not seem to be any settled rule or principle of treatment. Preparations of mercury, antimony, sulphur, zinc, baths, emetics, diaphoretics, and narcotics, have all in turn been recommended. Among these, the golden sulphuret of antimony is probably the remedy on which most reliance is placed. Patients who are debilitated or advanced in life require, it is said, the administration of tonics; and it is scarcely requisite to observe that an occasional application of strong mercurial ointment to the hair is requisite to destroy the vermin,

which breed in it with immense rapidity. It is unnecessary to say any thing on the management of false plica, in which the matting of the hair, arising from neglect, is present without any disease of the bulbs.

D. J. Corrigan.

PNEUMONIA, (πνευμονία); *peripneumonia*, or *peripneumony*, (περιπνευμονία); *pneumonitis, pulmonitis, peripneumonia vera*, (from πνεύμων, -ονος, *pulmo, a lung*, or *the lungs*;) are names given to an inflammation of the parenchyma of the lung, which is the most common of all the dangerous inflammations.

Peripneumony and pneumonia are the names applied by Hippocrates, Aretæus, Celsus, and other ancient writers on medicine, to most of the acute diseases of the chest without severe pain; those connected with this symptom being termed pleurisies. Many succeeding authors have not admitted this distinction; and inflammations of the lung have been as often described under the name of pleurisy as under that of pneumonia. The earlier cultivators of morbid anatomy, Valsalva and Morgagni, were the first to prove the distinct existence of the two diseases, but they gave no means of distinguishing them before death. Hence Cullen, although he makes pleurisy a species of the genus pneumonia, expresses his belief that the term pleurisy might with propriety be applied to every case of the disease. It is only through the aid of auscultation that pneumonia and pleurisy have been recognised as distinct diseases, and it is therefore only in the writings of those who have employed this method of diagnosis that the truly distinctive characters of pneumonia can be found.

Cullen's generic definition of pneumonia more frequently holds good than his specific distinctions, on the correctness of which, as we have just remarked, he does not insist. *Fever, pain in some part of the chest, difficult breathing, and cough*, which he ascribes to the genus pneumonia, are, in the greater number of instances, present in both pleural and pulmonary inflammation; but there are cases of both kinds in which each of these symptoms is absent. The specific definitions of pleurisy and pneumonia are still more frequently at fault; thus the *softer pulse, duller pain, constant dyspnœa, and livid face*, are as much the characters of severe bronchitis as of pneumonia, to which he ascribes them; and the *hard pulse, acute pain, increased on inspiration, painful decubitus on the affected side, painful cough, first dry, and afterwards with expectoration, often bloody*, the assigned characters of pleurisy, indicate pleuro-pneumonia as much as pleurisy, and are sometimes presented by bronchitis or peripneumony joined with pleurodyne.

The following is the character which we would give as most generally applicable to pneumonia:—*Fever, with more or less pain in some part of the chest; accelerated and sometimes oppressed breathing; cough, with viscid and rusty-coloured expectoration; at first the crepitant rhonchus, afterwards bronchial respiration, and bronchophony, with dulness of sound on percussion in some part of the thorax.* In this, however, as in many other diseases, pathology is the only sure basis of definition: pathologically, therefore, pneumonia consists essentially of an inflammation of the parenchyma of the lungs, occasionally but not necessarily extending to the pleura investing them; which inflammation, although it usually occasions a certain combination of general symptoms, is not so essentially connected with these symptoms as to receive from them an infallibly pathognomonic character.

The pathological and anatomical characters of pneumonia, as well as its relation to general symptoms, have been industriously and successfully investigated by the French pathologists, particularly by Laennec and Andral; and it is to them we owe the most important matter of the following history. Andral calls the disease pleuro-pneumonia, from the circumstance of some part of the pleural covering of the lung being involved in the inflammation: we do not deem it necessary to deviate from the example of Laennec, who confines this term to that form of the disease in which the pleura is affected in a sufficient degree to modify the pulmonary inflammation. This will be noticed among the complications of the disease.

I. General History of Pneumonia.

Symptoms.—Like other severe inflammations, pneumonia is accompanied by a pyrexia, which often commences in a rigor, prior to any other symptom. Sometimes this shivering fit does not occur until after the establishment of pain, dyspnœa, and other symptoms; and in some cases, especially where the pneumonia succeeds to a bronchitis, or when the first attack is felt in bed, it is not observed at all. Frequently, a feeling of great depression and languor, with pains in the back and limbs, and a disordered state of the stomach and bowels, precede the attack; then a shivering fit comes on, followed by a violent reaction, with great heat of the skin, and during this hot stage the local symptoms of heat, pain and oppression in the chest, with more or less cough, are developed. The pyrexia is generally very intense, and in plethoric individuals is accompanied by great flushing of the cheeks, injection of the conjunctivæ, headache, and other signs of local determination of blood. This general fever may precede by a day or two the local symptoms, sometimes diminishing in intensity when they appear; and sometimes continuing and masking them. The pain in the chest, which when present is generally an early symptom, varies greatly in degree, being sometimes very intense, sometimes diffused and dull; frequently it is a deep-seated feeling of heat and weight rather than of pain. Most commonly it is deep-seated in the anterior parts of the chest, below the sternum or below the mamma, sometimes under the scapula; acute pains are more common in either of the sides. Andral says that there is never any pain without an extension of the inflammation to the pleura; (Clinique Médicale, tom. ii. p. 327;) Laennec asserts, on the contrary, that there is frequently pain, and sometimes a point of sharp pain when no pleurisy is present, (De l'Auscultation Méd. tom. i. p. 432;) this is more in accordance with our own observation, and it is remarkable that in several of the cases described by Andral, where there were various degrees of pain, no mention is made of any inflammatory appearances on the pleura on ex-

amination after death. (Op. cit. obs. 29, 38, 43, 46.) There is commonly a cough at this time, which aggravates the accompanying pain, or causes a feeling of pain when none is otherwise present. It is generally at first either dry or accompanied with simple catarrhal expectoration, and short, not occurring in paroxysms, and is by no means proportionate to the intensity of the inflammation; it is sometimes so slight as scarcely to be noticed by either patient or attendants. The shortness of breathing or dyspnœa, which is commonly an early symptom, is a better measure of the extent and severity of the disease; but we should be mistaken if we always trusted to the feelings of our patients as to its presence or degree. In its slighter degrees they are not sensible of it, a supplementary quickness of breathing removing the sensation of dyspnœa; but an attentive observer readily discovers this quicker and shorter respiration, and the more perceptible elevation of the ribs and depression of the diaphragm that attend it. The number of respirations in a minute, which is in health about twenty in the adult, may now be counted at thirty and upwards, and in severe cases it occasionally exceeds sixty. In some examples, especially where the attack has been sudden, the dyspnœa is greater and more obvious, causing the patient to assume one particular posture, on his side, or on his back with his shoulders elevated; and from their sensibly increasing his oppression, he avoids all exertions of movement and speech; this difficulty of breathing continues to increase as the disease advances. The pulse is quick, and in most instances sharp. With respect to its hardness, it is subject to great diversity, but in many cases it is (notwithstanding Cullen's definition) both hard and full at the commencement of the disease. This character, however, rarely continues long, and often the pulse is weak and small from the beginning. Under the febrile excitement the urine is more highly coloured than in most other symptomatic fevers; and there is more or less of the thirst, white or brown fur on the tongue, loss of appetite, pain in the head and limbs, depression of the strength, &c., than usually characterize them, and blood drawn generally exhibits a buffed and concave crassamentum. This fever may affect particular organs especially, with the production of other symptoms; as the brain with delirium, the stomach with sickness, &c.; but these complications will be better considered hereafter.

The symptoms usually continue in this state from twenty-four to forty-eight hours. At a period varying within that space, the cough, which was hitherto dry or with the expectoration of common bronchitis, becomes accompanied by the expectoration of a very characteristic kind of sputa. They are of a yellow-reddish or rusty tinge of various shades, semi-transparent, tenacious, and running together into one mass. At first this expectoration scarcely exceeds the tenacity of the white of an egg, resembling in all but its colour the sputa of acute bronchitis, and, when poured out, falls in glutinous strings; but it often becomes so viscid that inverting the vessel and even shaking it in that position will not detach it. The same tenacity sometimes imprisons in the mass a multitude of little air bubbles, which may produce a spumous appearance. The colour may vary in numberless gradations from a light reddish or greenish yellow to a deep orange red or rusty hue. All these tints proceed from various proportions of blood intimately combined with the secretion of the bronchial membrane. This new feature added to the other symptoms is quite characteristic of the disease. The dyspnœa is frequently increased at this period, the inspirations being obviously short and quick; and if the disease is extensive, oppression becomes very urgent. The pain, on the other hand, is commonly diminished; sometimes it remains and prevents the patient from lying on the affected side. The most common posture is therefore on the back, as lying on the same side would restrain the supplementary expansion which is required there. Often connected with this posture, one of the cheeks is flushed, but there is no constant correspondence, as Dr. Stack has observed, between this and the side affected.

The disease may go on in favourable cases to the third or fourth day, and then decline in consequence of the resolution of the inflammation, which is indicated by a general alleviation of the symptoms. The pain and dyspnœa are considerably relieved; the cough becomes looser and less distressing; the expectoration less viscid and rusty-coloured, more abundant, and resembling the sputa of bronchitis. The pulse loses its sharpness, and more gradually its frequency; the skin becomes cooler, and sometimes moistened with perspiration; the urine is increased in quantity, and deposits a sediment. Sometimes this amelioration is a speedy process, and restores the patient to a state of convalescence in six or eight days; but it is sometimes more protracted, slight exacerbations recurring every evening, and some of the symptoms remaining stationary, and extending the duration of the disease to a fortnight or three weeks. The quickness of the pulse, and dyspnœa, sometimes with cough, are the symptoms most apt to linger, with a temporary recurrence of the sanguinolent tinge of the sputa; and although there is a great improvement in other respects, they are to be regarded as signs of a lurking disease which a slight cause may be sufficient to aggravate into a severe relapse.

The increase of the disease in more formidable cases manifests itself on the third or fourth day by an augmentation of the dyspnœa, which becomes so urgent as to oblige the patient to have his head and shoulders raised; and the inspirations short, forced, and amounting to from forty to sixty in a minute, are effected by sudden elevations of the ribs and depressions of the diaphragm; in some cases the side not affected obviously partaking disproportionately in the respiratory effort. The cough is sometimes more frequent, but this is not constantly present in aggravated cases. The viscidity and colour of the expectoration more exactly correspond with the increase of the disease; the tenacity reaches its acmé, so as to adhere strongly when the vessel is inverted, and even shaken in that position; and the colour is more deeply tinged with blood. The pulse becomes quicker, and often weaker and smaller. There is great depression of the bodily powers; and the patient's attention is engrossed by efforts to breathe under

the weight and oppression which he feels at the chest. The tongue is often loaded and dry: the skin sometimes continues harsh and hot; in other instances there are partial perspirations and coldness of the surface. Occasionally the features are livid; but this is less common in pneumonia than in severe bronchitis. Sometimes there is delirium or coma; these are dangerous symptoms, especially in old persons; and when present, they frequently disguise the character of the disease. We have known a case of delirium occurring in a supposed idiopathic fever, and another of delirium tremens, which proved fatal through an inflammation of the lung, which was only discovered after death. Hippocrates noticed the danger implied by this symptom; and succeeding authors have confirmed his remark. Laennec describes comatose affections, the result of sanguineous congestions in the head, as of much more unfavourable import than fierce delirium.

When the disease terminates favourably, the amendment is generally marked by some critical evacuation, such as perspiration, diarrhœa, expectoration, or a lateritious deposit in the urine. Of these Laennec considered the last to be the most common: Frank and Andral describe perspiration as more frequent; from our own observation we should say that these two are commonly conjoined; and there seldom occurs in pneumonia a perspiration that can be called critical, without at the same time a deposit in the urine. The latter, however, sometimes takes place when there is no manifest increase of the cutaneous perspiration. A copious expectoration does not occur so frequently as it is described by Sydenham and Cullen to have done; and it is probable that the character of the disease has in some measure changed since their time; for, as Laennec remarks, there are some epidemic forms of pneumonia which very commonly terminate by free expectoration, and which generally go on favourably after this is once established. Other critical phenomena happen more rarely; as epistaxis, hematuria or some other hemorrhage, the menstrual discharge, &c. The commencement of the amendment is generally pretty obvious, and usually occurs in the morning. The observations of Andral have in some measure confirmed the opinions of Hippocrates and other authors, ancient and modern, that there are certain days in the duration of the disease in which there is a greater tendency to amelioration. Of ninety-three cases, he found twenty-three give way on the seventh, thirteen on the eleventh, eleven on the fourteenth, and nine on the twentieth days. The recoveries in the remaining cases commenced on twelve out of forty-two non-critical days, as many as eleven being ascribed to the tenth day. (Clin. Méd. t. ii. p. 365.) Thus the recoveries on critical days averaged as high as fourteen, while those on non-critical scarcely exceeded three.

In cases of favourable issue, after continuing with greater or less intensity for the various periods just mentioned, and generally on the occurrence of some of the critical phenomena before named, the symptoms become mitigated, and a notable amendment takes place. The dyspnœa becomes less oppressive; the cough less constant; the expectoration less viscid and sanguinolent, and more free; and the pulse less frequent, often with an increase of fulness. The fever generally diminishes with the inflammation; if a critical perspiration have not already appeared, the skin soon becomes soft and moist; the tongue gets cleaner, and the thirst abates. Generally the patient is fully sensible of his real improvement; he feels each day a great accession of strength, and advances rapidly to convalescence. Some dyspnœa and quickness of pulse generally linger after the other symptoms; and there is sometimes a cough with an expectoration of bronchitic mucus, which in some cases remains for some time, but more commonly is carried off with those changes in the sputa which are observed in acute bronchitis. The breathing and pulse in some instances do not assume their natural slowness until after the patient has entered on a tonic and restorative method of treatment.

Relapses are by no means uncommon in recovery from pneumonia; and they are marked by a recurrence of the characteristic symptoms,—pain, shortness of breath, cough, and viscid sanguinolent expectoration. The fever has seldom so sthenic a character as at the first attack, and frequently it is decidedly adynamic, the strength having been reduced by the previous disease and treatment. Hence a relapse, if a serious one, is often more dangerous than the first attack.

The progress of fatal cases of pneumonia is marked by a continued aggravation of the dyspnœa, with increasing failure of the strength. The cough becomes less capable of expectorating the sputa, which sometimes retain their viscidity and sanguinolent hue as long as any are voided. In the greater number of instances there is a total suppression of the expectoration for some hours before death; but in others it is still excreted, but of a different character. Sometimes it is merely pituitous, transparent, or of a dirty tinge; sometimes it is a semi-opaque dirty mucus; occasionally purulent specks of a yellowish white colour are visible in it; more rarely it is purulent, with streaks of blood, or in opaque nummulary forms of a yellowish white colour, consisting of pus and a little mucus. Not unfrequently various mixtures of these different kinds are seen together; but the whole sputa in the latter stages of the disease are generally scanty. Andral describes sputa of a very remarkable kind as occasionally occurring in the last stage of pneumonia: they consist of a slightly glutinous liquid of a reddish brown colour, resembling liquorice-water or thin syrup of prunes. Rarely, sputa of a mixed greenish and dirty red or grey colour, and putrid fetor, are the last observed. With any of these changes in the expectoration the state of the patient puts on a worse aspect; the pulse becomes thready and intermittent; the countenance pallid, cadaverous, and bedewed with a cold sweat; the lips livid, the breathing gasping and convulsive, with a rattle in the throat; the sensorial functions, if entire before, now give way, and the patient dies asphyxiated.

Such is the general type of pneumonia as it presents itself to the semeiological observer. This appears to be the proper place to enumerate historically the causes which have been observed to excite the disease, or favour its production; and we shall afterwards proceed to scrutinize more

closely the various changes which constitute its pathological history. Unfortunately the principal part of our knowledge of these changes has been derived from a study of their effects in the dead body. It will, therefore, give better ground to our pathology, if, after enumerating the causes, we describe the anatomical characters of pneumonia.

[Pneumonia and acute rheumatism are diseases in which the increase in the proportion of the fibrin of the blood has been the greatest. In 84 bleedings, practised by M. Andral, (*Hématologie Pathologique*, p. 87: Paris, 1843, or Amer. edit. 1844,) on the course of well-marked pneumonia, there were only seven in which the proportion oscillated between four and five in the 1000; in the 77 others, it exceeded this;—maintaining itself, in eleven cases, between five and six; in nineteen between six and seven; in fifteen between seven and eight; in seventeen between eight and nine; in nine between nine and ten; and in six it rose as high as ten, and even exceeded this a little.]

Causes.—The previous occurrence of the disease seems more than any other circumstance to predispose to pneumonia. Rush describes the case of a German living in Philadelphia, who had the disease twenty-eight times. Andral gives a case in which it recurred the sixteenth time within eleven years. (Clin. Méd. t. ii. p. 192.) Dezoteux treated seven times a pneumonia in a subject who had suffered from it fifteen times, (Dict. des Sciences Méd. t. xliii. p. 396); and Chomel alludes to its recurrence the tenth time in the same individual. (Dict. de Méd. Art. *Pneumonie*.) Perhaps the only other circumstance that can be fairly viewed as a predisposing cause, is the presence of tubercles in the lungs. It has been said that the adult age, the male sex, a sanguine temperament, and certain occupations, as those of singers, street-criers, public speakers, &c. predispose to the disease; but if it occurs more frequently in persons under such circumstances, this is to be referred to their being more exposed to the existing causes, rather than to any constitutional predisposition. [M. Grisolle, (*Traité Pratique de la Pneumonie*, &c. Paris, 1841,) has, indeed, found that when males and females are equally exposed to field and other open air labour, the proportion attacked with the disease is the same. In infancy, too, females suffer as much as males.] With regard to age, it has not been found, since the disease has been accurately distinguished, that any age is particularly exempt from it. The symptoms are generally more prominent in middle life, and it is therefore more readily distinguished; but infancy and old age appear to be equally liable to it. M. Guersent reports the disease to be very common and fatal among children; and that of the deaths among those in the hospital of sick children in Paris, before the completion of the first dentition, three-fifths occur from pneumonia, chiefly latent. (Ibid. t. viii. p. 96.) From our own observation we are inclined to consider young children as more frequently the subjects of pneumonia than adults. Of fifty-five cases attended by Mr. Byam and the writer during one year, at a dispensary in the parish of St. Marylebone, thirty-two were of the age of six years or under. Neither Laennec nor Chomel concurs with Stoll and Auenbrugger in considering persons of sedentary modes of life, such as tailors, the most liable to pneumonia. Masons, porters, out-door labourers, and carpenters, present the greatest number of examples, which is plainly to be ascribed to their being more exposed to the exciting causes. The same circumstance is, as M. Chomel observes, the reason why men suffer more frequently than women. Out of ninety-seven cases which occurred in the wards of La Charité, under his care, seventy-three were men, although the number of patients of either sex was nearly the same. (Dict. de Méd. t. xvii. p. 211.)

Cold, excessive exertion of the lungs by violent exercise or by the voice, the inhalation of irritating vapours and asphyxiating gases, wounds of the lungs and blows on the chest, the bite of the rattlesnake, and the action of some other poisons, as fungi, may be named as exciting causes of pneumonia. To these may be added several diseases on which this inflammation occasionally becomes engrafted; such as bronchitis, hooping-cough, pulmonary apoplexy, phthisis, the exanthematous, continued, and sometimes traumatic fevers, particularly those supervening on extensive injuries or operations. It is so frequently complicated with hooping-cough, small-pox, and measles in children, that we consider the danger of these affections in a great measure to arise from this complication. In common with other inflammations, it may be occasioned by the suppression of habitual discharges, as the catamenia, hemorrhoids, and other hemorrhages, and issues or ulcers of long standing. The inflammations of gout, rheumatism, and cutaneous diseases, are sometimes transferred to the lungs by metastasis.

The influence of cold in producing inflammation of the lungs is sufficiently apparent in the much greater prevalence of the disease in cold seasons and cold climates. Of ninety-seven cases recorded by Louis in Chomel's wards at La Charité during five years, eighty-one occurred between February and August, and only sixteen in the remaining five months of these years. Of the cases described by Andral, the number occurring in March and April amounted to a third of the whole; the fewest took place in May, October, and November, and the remaining months had an equal share. Of two hundred and forty-three cases which were treated at the Edinburgh New Town Dispensary during three years, ending September 1, 1824, sixty-seven occurred from 1st September to 1st December; one hundred and four from 1st December to 1st March; ninety-four from 1st March to 1st June; and sixty-eight from 1st June to 1st September. We have observed in London nearly an equal prevalence of the disease from the beginning of December to the end of April, and a considerably smaller proportion in the remaining months; but it appears generally that the latter winter and early spring months are most fertile in producing pneumonia in these climates.

[Recent statistical observations show, that three times as many cases of pneumonia have been observed in the French hospitals in the first six months of the year as in the last, and such was nearly the proportion in the Pennsylvania Hospital during the years 1840, 1841 and 1842,—39

cases having been received in the first six months, 12 in the last.]

Pinel and Briehetau consider the most frequent cause of pneumonia to be the sudden exposure of the heated body to cold after violent exertion, especially that of the voice. (Dict. des Sc. Méd. t. xliii. p. 396.) Laennec remarks on this point that cold long-continued, or applied when the body is only moderately heated and covered with perspiration, is much more powerful as a cause of pneumonia, than when cold succeeds to an excessive heat, and is not long continued: "the Russian who rolls himself in the snow after coming out of a hot bath, or the baker who goes from his heated oven, almost naked, into an atmosphere of a temperature below the freezing point, is not liable to attacks of the disease; while the porters, whose occupation leads them to stand for a length of time at the corners of the streets, are frequently affected by it." (Dr. Forbes's Transl. 3d edit. p. 225.) It is certain that cold winds or cooling influences long applied, are more sure to produce the disease than mere changes of temperature; and the perspiring body must obviously suffer more as it is exposed to the additional cooling agency of evaporation. Transitions of temperature of short duration are more effectually resisted by the body; and if the reaction from them produce any inflammation, it is generally one of the mucous membrane, a coryza, a cynanche, or a bronchitis: it is when the cold has penetrated deeply that the parenchymatous inflammations more frequently follow. Hence, besides cold winds, any kind of exposure at a low temperature, as on horseback, sleeping in the open air, &c., occasionally excite pneumonia. Rarely it has been produced by drinking cold liquids when the body is in profuse perspiration, and sometimes by intemperate indulgence in alcoholic liquors.

The cause of the greater number of cases is, however, either unknown, or of the obscure character in which epidemic and endemic influences are involved. Of seventy-nine cases investigated by Chomel, fourteen of the individuals had been exposed to cold; five had taken an excess of wine, one had been over-fatigued, one had suffered great mental excitement, one had breathed for some length of time the fumes of charcoal, and the remaining fifty-six could assign no cause for their complaint. (Dict. de Méd. t. xvii. p. 213.) The epidemic occurrence of the disease is clearly proved; and such has been its extent, that a contagious nature has been ascribed to it. Laennec remarks that epidemic pneumonia is probably often owing to deleterious miasms, suspended in the air, entering the circulation and operating particularly on the lungs, as the poison of the rattlesnake and of some fungi is said to do: hence many persons are seized in their very chambers in spite of the utmost care taken of their health. (Op. cit. p. 225.) In many epidemics it is difficult to decide the amount of influence which known physical causes, such as changes of temperature and moisture, may have in determining the production of morbific effects on the body; but no meteorological observations have ever discovered in the physical conditions of the air a sufficient cause for the remarkable prevalence of this disease, which occasionally constitutes a third, or even a half of the acute complaints of our hospitals. In one of these epidemics, it was observed by Huxham that the disease showed itself in the form of bronchitis in low and damp situations, while at a short distance, on elevated spots, it prevailed as a peripneumony. Elevated districts are perhaps the more liable to pneumonia because they are more exposed and colder; whereas the humid air of low valleys, whilst it diminishes the intensity of the cold, relaxes more the mucous surfaces, and renders them the weaker points of the circulation. The account of Hippocrates would not seem to coincide with this statement, as he describes pneumonia as common in marshy districts, (De Aere, &c.,) but that he probably includes severe bronchitis also under this name. Hoffmann ascribes to pneumonia an endemic character in some parts of Westphalia, Sweden, Pomerania, Denmark, and Russia; but the physical climates of these countries is a sufficient explanation of its prevalence, and Britain may as fairly be added to the list. Nor are the milder climates free: at Nice, Genoa, Pisa and Florence, the disease prevails greatly, and cuts off a good many of the inhabitants. (Clark on the Influence of Climate, 2d edit. p. 121.) The neighbourhood of Mount Vesuvius is remarkable for the frequency of its occurrence: here it may more properly be called endemic, as it may reasonably be attributed to the noxious exhalations which prevail there. (Vivenzi Epist. ad Haller. iv. Bouillet, Mém. sur les Pleuro-pneumonies Epidem.)

[In the United States, it is a very common disease, and in some parts of it more common than in others.]

II. Anatomical Characters of Acute Pneumonia.

We owe the most accurate information which we possess on the morbid anatomy of this disease to the researches of the French pathologists, particularly those of Laennec and Andral. There are, however, many doubtful points relating to the essential seat and effects of the inflammation which still remain to be cleared up before our pathology of pneumonia can be considered accurate.

Laennec arranges the general effects of inflammation on the lungs into three stages or degrees, each of which is distinguished by marked characters: The first degree, or *engorgement;* the second degree, or *hepatization;* the third degree, or *purulent* infiltration. These are the common effects which inflammation in its general course produces in the lung. Abscess and gangrene are of uncommon occurrence, and to be viewed as exceptions, rather than as regular events.

In the first degree of inflammation, the engorged or obstructed state, the lung is externally of a dark or livid red colour, to which a slight, whitish opacity of the pleura sometimes gives a violet hue; it is heavier and more substantial to the touch than a healthy lung: when pressed, it yields less of the crepitating sound and feel, and instead of generally collapsing under the pressure, and partially rising on its removal, it receives and retains the impression of each finger, giving the feeling of a liquid contained in cellular substance, as in an œdematous limb. On examining it closely through the transparent pleura, there are seen numerous little round bubbles of air without

the angularity of the natural vesicular structure; and the septa, which are commonly very visible, are scarcely to be discerned. On cutting into the lung in this state, a bloody serum, containing numerous minute air-bubbles, flows from it; sometimes in great abundance and almost clear, sometimes more scanty and sanguinolent, or turbid, and with various proportions of the spumous bubbles. The substance thus cut into is of a red colour, of various shades; crimson, dark red, brown red, chocolate red, or of a livid puce colour, approaching to black. The vesicular texture of the lung can still be discerned, particularly after the serum has drained from it; and by pressing it gently and washing it repeatedly, the natural colour, appearance, and elasticity may in some degree be restored. There are varieties in this state of engorgement, some of which depend on the degree or duration of the inflammation, and others on individual peculiarity. The progress which the inflammation has made is pretty accurately represented by the defect of air in the tissue; in the slightest degree, there being a good deal of air, the lung feels still crepitous, and the serum which flows from it is very frothy. The quantity of serum indicates rather the intensity of the inflammation than its duration; but, as far as we have observed, it partly also depends on the coagulability of the blood. In recent severe inflammations, which have proved fatal in the first stage, it is generally very copious; but in those which have endured for several days, it is seldom as abundant even in points where the second stage has not commenced. The progress towards this second stage is marked by a paler colour, a diminished quantity of both liquid and air, and an increasing solidity of the tissue. There is another variety of the inflammatory engorgement, probably depending more on the state of the blood than on the degree of inflammation: the lung presents an extreme lividity, and when cut, instead of yielding serum, exudes slowly a dark, grumous blood in greater or less quantity. This appearance is noticed by Chomel, (Dict. de Méd. t. xvii. p. 235,) as occurring particularly in cases of pneumonia complicated with other acute affections, as fevers; and we have repeatedly observed it. The writer, together with Mr. Byam, recently examined the lungs of a child of eighteen months, affected with chronic hydrocephalus, who was carried off by an attack of pneumonia: both lungs were partly hepatized, and partly of a very dark red colour, appearing of a livid purple through the pleura; some parts of this inflammatory engorgement still contained a good deal of air, and, when pressed, exuded merely a little grumous blood, mixed with bubbles. Other parts of the lung were hepatized. The child had repeated attacks of convulsions during the two days before his death, and between four and five ounces of serum were found between the membranes and in the ventricles of the brain, which was uncommonly voluminous. But what we think most worthy of remark is, that the blood was fluid in all the vessels examined, and this we apprehend to be the cause of the peculiar character of this inflammatory engorgement of the lung. This was probably the case, also, in the complications noticed by M. Chomel, for a fluid state of the blood is very commonly observed in typhoid fevers after death. We consider that these circumstances render it probable that the separation of the serum in the engorged lung is more a cadaveric than a pathological process; and that, as the blood coagulates in the distended vessels, its serum transudes into the vesicular structure. Where, on the other hand, the blood does not coagulate, it is too thick a fluid to exude into the cells, or to flow freely as serum does when the lung is cut. We do not maintain that there is no interstitial serous effusion during life; the analogy of other inflamed parts renders it probable that it does take place, but, we suspect, by no means to the extent which is commonly found in the engorged lung after death. We shall revert to this point when speaking of the pathology.

The colour of the lung inflamed to the first degree depends on the blood in it, in some cases deepened or modified by the black pulmonary matter: in the lungs of old people the abundance of this matter gives the inflammatory infarctus a blacker or more dingy hue; whilst in children the colour of the blood entirely prevails. Although very much heavier than was natural, a portion of lung in this state retains enough air to prevent it from sinking in water. Another remarkable change wrought in the lung by the most considerable degrees of inflammatory engorgement, is a diminution in its molecular cohesion, so that the fingers break through or tear its substance much more readily than in a healthy lung. This effect was first described by Andral, (Clinique Médicale, t. ii. p. 307,) and afterwards by Chomel, (Dict. de Méd. loc. cit.) Andral formerly considered this softening of the tissue a test by which inflammatory engorgement might be distinguished from that produced by gravitation, the mechanical hyperæmia; but he has since abandoned this opinion, and, as did Laennec in his clinical lectures, referred the more easily lacerable state of the lung to the physical effect of an unusual proportion of blood in it. "The reason of this fact will be readily understood if we reflect that when the lung contains a much larger proportion of air than of blood, the parietes of the bronchia, when pressed by the finger, press in their turn on the compressible fluid they contain, and in this way, by compressing or expelling the air, retire before the pressure of the finger, and so escape being ruptured. But when the lung contains a larger proportion of blood than of air, the former fluid being almost wholly incompressible, the pulmonary tissue cannot recede from under the finger, and is therefore easily ruptured." (Andral's Pathological Anatomy, *translation*, vol. ii. p. 510.) Chomel, however, in his article before quoted, published in 1827, still maintains the applicability of this test; he says that the merely congested lung preserves its natural consistence; but the inflamed lung in great measure loses it, insomuch that it requires very little force to make the fingers break through its substance. Our own examinations have led to conclusions somewhat different from those of both these authors. We are convinced that both inflammatory and mechanical engorgements tend to diminish the cohesion of the parenchyma more than the mere increase of liquid in it can explain, and for the

following reasons: 1. if a portion of the healthy tissue adjoining an engorged portion be pulled gently, a laceration takes place in the latter before the healthy portion is stretched to the utmost, and with a much smaller degree of force than is required to tear this healthy portion: 2. the fragility of the tissue is not always in proportion to the quantity of liquid in it: 3. an engorged portion of lung does not lose its greater friability when the blood has been gently pressed and washed out of it. We have never been able to discover any physical difference between the first stage of marked inflammation and that engorgement supposed to be a mechanical congestion in the most dependent part of the lung occurring shortly before and after death; and it would appear from the observations of Laennec, that the resemblance between the latter state and pneumonia is not confined to the anatomical appearances; for where the agony, or moribund state is prolonged, points of hepatization are formed in the most congested portion of the lungs; so that this author was led to class them as the results of real inflammation, which he called *pneumonia agonizantium*. (Op. cit. p. 241.) In these remarks he is confirmed by Louis. (Recherches sur la Phthisie, p. 30.) Whilst, therefore, we are led to recognise softening of the parenchyma as the pathological result of hyperæmia or sanguinous congestion, we find in it no distinction between active idiopathic inflammation and that congested state of lung which supervenes, in some measure mechanically, on an obstructed state of the pulmonary circulation.

The second stage, *hepatization*, (the red softening of Andral,) has very distinctive characters. A lung in this state is solid and elastic to the touch, of the consistence and weight of liver, and portions of it sink in water: it is no longer crepitous, neither does it, when cut, yield bubbles of air, but when pressed, a bloody fluid exudes sparingly from it. Its friability is generally greater than in the first stage, the fingers readily breaking through its substance; and if a portion be pressed between the fingers, it is reduced to a red homogeneous pulp. A hepatized lung appears to be more voluminous than is natural, but this depends on its being solid, and not collapsing, as a healthy lung does, on opening the thorax. Externally its colour is seldom so deep as in the first stage, and when cut into, it is also lighter, presenting shades varying from a blood or livid red to a light pinkish purple or colour of muscle, and various degrees of these colours are sometimes seen mottling the lungs so as to resemble some kinds of marble. Scattered through the hepatized portion various lines are visible, of a lighter colour, and specks almost white; a close examination discovers the former to be portions of the interlobular septa, less affected with inflammation, and the latter sections of bronchi or blood-vessels, whose coats have entirely escaped. There is generally in a hepatized lung another character, which becomes apparent on a close inspection, and more plainly with the aid of a lens. On a portion being cut, a number of little points can be distinguished, looking like grains of a somewhat lighter colour than the intervening spaces; and if the surface be wiped or lightly scraped, these grains appear slightly elevated, as if they consist of a more solid material. They may be made still more obvious by tearing the hepatized lung; they are then seen as little ovoid bodies, and may be detached singly from the tissue. In most instances these grains are closely pressed together so as to constitute the chief substance of the diseased part; but sometimes there are interstices of a darker colour, and in some cases the granular appearance is entirely absent. This uniform non-granular solidification of the lung, described by Andral (Path. Anatomy, vol. ii. p. 510,) and Chomel, (Dict. de Méd. t. xvii. p. 237,) is not recognised by Laennec, who considered the granular appearance as an essential character of hepatization; but from having seen the condition observed by the other authors as an indubitable result of inflammation, we do not hesitate to describe it as a variety of hepatization. This state of the lung differs from common hepatization in the absence of the granules, and a consequently darker and more uniform texture: it is sometimes softer, and bears a considerable resemblance to the substance of the spleen, whence it has been called *splenization*. In appearance it resembles that condition of the lung produced in pleuro-pneumonia, called by Laennec *carnification*, which we shall allude to hereafter; it differs, however, from this in being more friable. Andral was, we believe, the first writer who ascribed the granular appearance of a hepatized lung to the individual vesicles; and in this opinion he is followed by Laennec and Louis. In the second volume of his "Clinique Médicale," (p. 312) he describes the inflammation in pneumonia as occupying the air-vesicles, the internal surface of which secretes a viscid mucus, which, accumulating so as to fill their cavities, produces the granular bodies in question. In confirmation of this opinion, Louis asserts that this appearance can be imitated by gently injecting the bronchi. (Recherches sur la Phthisie, p. 9.) Laennec says that these little bodies "are evidently air-cells converted into solid grains by the thickening of their parietes and the obliteration of their cavities by a concrete fluid." (Transl. p. 201.) Many minute examinations which we have made of hepatized lungs have convinced us that the granulations contain no viscid mucus, nor does their appearance by any means confirm the opinion of Andral. They appear rather to consist simply of the little bunches of vesicles, (in which, according to Reisseissen, each minute bronchus terminates,) whose membranous tunics have become so swelled by the deposition of a soft albuminous matter in them, as well as from the increased size of their blood-vessels, that their cavities are obliterated. Both from the uniformity of their appearance when examined, and from the absence of any such matter in the sputa before death, we have long doubted that there is any effusion into the cavities of the air-cells, as supposed by Laennec; and Andral, in his latter work, seems to take a somewhat similar view, which he illustrates by the appearance presented by an inflamed lung when carefully dried. When the lung is in the first stage of inflammation, "the only morbid appearance it presents when dried is a reddish, yellow, or brown tinge in the parietes of its capillary bronchia and air-cells; and in

some cases even this shade of colour is wanting, and the lung, which before being dried presented a remarkable degree of congestion, when dried differs in no respect from a healthy lung. When the experiment of drying is tried on a hepatized lung, the parietes of the capillary bronchia and of the air-cells present invariably a red colour, and are, moreover, considerably thickened, so as to cause in some points a remarkable diminution, and in others a total obliteration of their cavities." (Path. Anat. vol. ii. p. 511.) The same sagacious pathologist refers the absence of granulations in the variety of hepatization before described to the greater degree of tumefaction which the air-cells undergo, by which they are approximated so closely as to be confounded together. This explanation does not seem to accord well with the darker hue of this varicty ; and we are inclined to hazard the opinion that the inflammation and swelling are in this case chiefly in the vessels and interstitial tissue between the cells and the bronchi, without involving the membrane which principally constitutes these cells, and which analogy would point out to be of the nature of mucous membrane. We propose this explanation merely as a question, and it is one of some interest ; for if it should be confirmed by further observation, it would open a more important inquiry whether such variety in the seat of the inflammation is distinguished by any peculiarity in the pathological history of the disease. The discrimination between the minute elementary tissues of the alimentary canal, in relation to disease, has not been without its practical utility ; and there can be little doubt that inflammation of the lungs would exhibit some variation in its signs or course according to the parts of the parenchyma which it affects.

[The average weight of the healthy lung is about 235 grammes. M. Grisolle (*Op. cit.*) has found the organ, in the state of red hepatization, to weigh 2500 grammes,—considerably more than ten times the natural amount.]

The advance of a hepatized lung towards the third stage is marked by its becoming lighter in colour and less humid. The change in colour seems to be produced by a substitution of more of the yellowish white semi-solid albumen for the red particles in its substance, by which the deep red or dull red of hepatization passes into a salmon-colour or a dingy pink, variously marbled in the degree of its progress, as well as by the mixture of black pulmonary matter. It is at this period that a hepatized lung attains its greatest degree of solidity ; when gently pressed, a turbid red liquid exudes scantily from it : very little additional pressure crushes its substance into a thick pulp ; for although its compactness is increased by the effusion into its substance, its molecular cohesion is greatly diminished.* A close inspection will generally discover that the granulations are the lighter points, and sometimes minute yellowish-white specks can be discerned in them, which are the first development of pus.

The lung affected with the third degree of inflammation, or rather its third effect, purulent infiltration, presents a still further change of character. It generally changes the red tinge for a yellowish drab or stone colour, which is still varied with red in parts less advanced, and with grey, blue, or bluish green, from the admixture of black pulmonary matter.† At first the lung retains the weight, compactness, and granular texture which characterize hepatization, the change being confined to the colour; whence this state has been called yellow hepatization, *hépatisation grise*, and by Andral, *ramollissement gris*,‡ from its increased friability. On cutting into it, no matter exudes in this early stage of suppuration, because the cohesiveness of the texture is still sufficient to retain it ; but very slight pressure reduces it to a thick purilage, in which pus obviously constitutes a principal part. In a more advanced degree the colour is of a straw or sulphur yellow, which begins in patches and spreads through the mass : on cutting into the lung, no granular texture can be seen ; but a yellowish, opaque, purulent matter oozes in greater or less abundance, according to the progress which the suppuration has made. The solid matter obviously diminishes as the pus is secreted ; for after squeezing this out, what remains in the hand is a mere debris of the pulmonary tissue, with a few granulations in which the suppuration has not advanced. Except in particular cases, the matter thus formed has a much fainter odour than that from an ordinary abscess. The softness of the lung in this state is so great, that even the slight pressure of a finger readily makes a cavity, which immediately fills with pus ; and both Laennec and Andral remark that this may be inadvertently produced in the course of examination, and mistaken for an abscess. In the most advanced stages of purulent infiltration, a lens will sometimes enable us to perceive that the only remnant of texture is a course irregular network, composed chiefly of vessels, bronchi, and the septa of lobules.

The purulent infiltration just described is the form of suppuration to which pulmonary inflammation tends ; the matter is rarely collected in a focus, and still more rarely in an encysted abscess. Laennec and Andral have recorded a few instances

* This character led M. Andral to call hepatization *red softening ;* but the objectionable nature of this term is sufficiently apparent from the fact that Laennec misunderstood its meaning (op. cit. p. 206, note) ; and Chomel described the state in question as a hardening of the lung (*endurcissement rouge*, Dict. de Méd. loc. cit.) Andral meant *friability*.

† These appearances are beautifully and faithfully delineated in the first number of Dr. Hope's coloured illustrations of morbid anatomy, the inspection of which will be more instructive to the student than any verbal description ; see especially fig. 4. From the blue shades which slight admixtures of the pulmonary matter produce, Dr. Hope supposes that this matter is sometimes blue : we believe, however, that this colour depends on a property which all whitish semitransparent bodies possess of transmitting the yellow and red, and reflecting the blue rays, so that, when the light transmitted through a thin transparent film is absorbed by a dark body under it, the blue rays are reflected from the film. Nothing illustrates this more perfectly than opal glass, through which dark objects appear blue, and light ones orange ; and an example of the same optical effect more in point may be given in the superficial veins, which through the skin appear blue, although they contain nearly black blood.

‡ This word *gris* is not here to be translated *grey*, a mixture of black and white, but *drab* or stone-coloured, like light brown paper, which in France is called *papier gris*.

where the suppuration had in one part become complete, and contained pure pus, whilst the adjoining parts were in a state of purulent infiltration quite diffluent on the margin of this sort of abscess, but firmer as they receded from it. This event has generally occurred in cases of partial peripneumony; and it appears to be no more than a completion of the process of suppuration, of which ordinary infiltration is only the beginning. The reason assigned by Laennec is probably correct;—that abscess of the lung is rare, because cases of partial peripneumony usually yield early either to nature or art, while an affection of greater extent produces death before the tissue can be removed by absorption. He cites a case in which a cavity lined with a strong false membrane, and capable of containing a pint and a half of fluid, existed in the middle of the right lung; the pulmonary pleura was destroyed to the extent of more than six square inches, and the wall of the cavity on this side was formed by the costal pleura, which adhered closely to the lips of the excavation. Several bronchial tubes opened into this cavity. (Op. cit. p. 208.) As there were no signs of tubercles, Laennec considers the cavity to have been caused by an abscess. A similar case occurred to Dr. Chambers at St. George's Hospital, and the lung is preserved in the museum there. A case of encysted abscess was shown to the Academy of Medicine by Dr. Honoré in 1823. It was filled with pus, as large as a middle-sized apple, and surrounded by a hepatized state of the lung. The general testimony of the latest pathological anatomists is in support of the opinion of Laennec, that the termination of pneumonia in abscess is of rare occurrence. Broussais says that he only met with it once; and in this case the inflammation was produced by a musket-ball, lodged in the lung for six years. (Hist. des Phlegm. Chron. tom. ii. p. 111.) Andral considers it extremely rare, and questions the accuracy of Laennec's statement, that in the year 1823 he met with more than twenty cases of partial peripneumony terminating in abscess. If we compare these opinions with the writings of Morgagni, Baillie, or, in fact, any writer on morbid anatomy prior to the last twenty years, or with the notions of the less informed of the present day, we shall be surprised at their discrepancy with the frequent mention of abscess of the lungs by these latter. The common error has been to mistake tubercular vomicæ, which are of very common occurrence, for abscess; and it is not always easy to avoid the mistake, even in the present state of our knowledge. Laennec says that tubercular cavities are to be distinguished by their containing some remains of the tubercular matter, or by the coexistence of tubercles in other parts of the lungs; but these remains may have been eliminated; and where a rounded vomica, containing only pus, is found singly in an inflamed lung, it may readily be mistaken for an abscess. Such examples show how uncertain are the anatomical distinctions between vomica and abscess; and perhaps any absolute boundary between these lesions is not to be met with in nature. We may recur to this subject when speaking of chronic peripneumony.

Abscesses of the lungs have sometimes been met with unattended with any marks of inflammation; the pus being apparently secreted in some other part of the system, is merely deposited in the lungs. We remember to have seen several abscesses of this kind in the lungs of a woman at the hospital of La Charité at Paris, who died with diffuse cellular and venous inflammation and suppuration of the leg and thigh. They were small, round, full of pus, and lined by recent coagulable lymph, the adjacent pulmonary tissue being quite crepitant. The liver, the spleen, and one of the kidneys presented similar abscesses in their parenchyma. Many other examples are on record of both circumscribed deposits and infiltration with pus after great surgical operations, (*Andral*, Path. Anat. vol. ii. p. 540. Dr. Hope's Illustrations, &c. part i. fig. 10, 11, 13); but as these are not connected with pneumonia, we need not describe them here.

Gangrene of the lung is rarely a consequence of inflammation. That it is so at all is questioned by Laennec, who considered this lesion as idiopathic, like hospital gangrene or anthrax, and as exciting rather than following the inflammation, which he says is by no means of an intense kind. It has, however, been fully proved that gangrene of the lung does occasionally succeed to inflammation of the organ, although, as in the case of abscess, it likewise occurs independently of it. Inflammation may be so intense as to destroy the vitality of a part, as mechanical injuries or chemical decompositions do; and of the occurrence of this event in the lung, there are a few instances on record. (*Andral*, Clin. Méd. t. ii. p. 295. Dr. Hope's Illustrations, part i. fig. 4.) As a consequence of acute inflammation, gangrene is commonly diffuse, surrounded by purulent infiltration or hepatization, and bounded by a deposit of lymph. The colour of the gangrenous part is a greenish brown, a dirty olive, or a dark brown, which a certain admixture of purulent and black pulmonary matter in some parts changes into a greenish grey. It is about the consistence of the lung in the third stage, except in some points where the sphacelus is more advanced and diffluent, and a turbid or greenish sanies runs readily from it. It is, however, the putrid fetidity which most distinguishes gangrene, and this test enables us to discover the presence of slight degrees of gangrene where it is not sufficiently extensive to affect the colour. Where the tissue is in the third stage, the colour as well as the odour readily characterizes it, but the hepatized lung bordering on gangrene can only be detected by its odour. We have sometimes found portions of hepatized lung very fetid, and although not materially altered in consistence, and only a little darker in colour than usual, we have been induced to think that the gangrenous process had commenced in them. M. Chomel describes a gangrenous condition of the lung, which is seen in the bodies of those who have died after some days' illness in consequence of being exposed to the effluvia of cess-pools or sewers. The lung is found almost black or greenish, full of a sanious, greenish, and extremely fetid liquid, softened in many places, and in some falling into deliquescence. Chomel thinks this lesion marks the passage of the first stage of inflammation into gangrene. The same

pathologist supposes the possibility of a whole lung being destroyed by gangrene in the case of its being compressed and rendered impermeable to air by an extensive pleuritic effusion; and he quotes a case, which he conceives to be of this kind, from the *Opuscula Pathologica* of Haller, in which the left lung had entirely disappeared, and the pleural sac was filled with a quantity of fetid albuminous liquid, in which the large vessels and bronchi terminated as if they had been cut off. (Dict. de Méd. t. xvii. p. 240.)

Circumscribed gangrene, if the result of inflammation at all, follows only the chronic kind; being apparently caused by the obstruction to the circulation which chronic inflammation sometimes produces in the lung. This form of gangrene more frequently occurs independently of inflammation, as the result of various septic influences present in the system, and answers more exactly to Laennec's opinion respecting pulmonary gangrene in general. For an account of the relations of gangrene to these causes and to inflammation, we refer the reader to the article MORTIFICATION.

We have hitherto described the general type of the several consequences of inflammation of the lung as detected by anatomical investigation. It remains for us now to notice the different varieties which individual cases present with regard to combination, extent, and complication of these inflammatory lesions.

Pneumonia is called *lobar*, *lobular*, or *vesicular*, according as it affects whole or continuous parts of lobes, or certain polygonal subdivisions of these, or single bunches of vesicles. Lobar inflammation is the most common, and may be limited to an irregular portion of a lobe, or it may involve a whole lung, or a great part of both lungs. When the inflammation is extensive, it is commonly found in different degrees of advancement. The most frequent of these combinations is the engorgement or first stage, with the second, hepatization; and the gradual transition of one into the other may here be very distinctly seen. The greatest advancement is commonly at the lower parts and margins of the lobes, (which are, according to Laennec, the most usual seats of peripneumony,) where we have the solid, airless, liver-like state of the second stage. In receding from this towards the less inflamed portions, the lung is more livid, softer, and moister, but still does not crepitate on pressure, and, except in some spots, does not pit, but breaks under the finger. Further still, there is some crepitation, but the lung feels heavy and yielding to the touch, and is of a dark red colour. In the slighter degrees of inflammatory engorgement, the colour is brighter and the crepitation more distinct, and the serum that flows on incision is very frothy. There is frequently around the inflamed part an œdematous state of the tissue, the colour of which is natural, but a yellowish frothy serum flows from it on incision. The third stage can also generally be traced in progressive degrees from the hepatized portions, lightening them by marbled shades of a paler or yellower hue, which sometimes take the shape of the polygonal lobules, and sometimes pass continuously over the interlobular partitions without distinction. Where these transitions of colour are abrupt, and mottled with black pulmonary matter, there is produced that appearance which Laennec compares to some kinds of granite, with its red and yellow felspar, grey quartz, and black mica. Combination of these three degrees may affect the whole of both lungs; and this to the extent that the whole of one lung, and more than half of the other, are solidified; but it is obvious that they cannot be so far involved in the second or third degrees, as life must be destroyed long before they could be rendered so totally impervious to air.

The anatomical evidence as to the parts of the lung most frequently affected by pneumonia is not entirely in accordance with that furnished by clinical observation. Hence we find Morgagni, Frank, and Broussais, who draw their conclusions from dissections, assign the upper lobes as the most frequent seat of inflammation; while Laennec and Andral, who included cases of recovery in the calculation, found the lower lobes to be most commonly inflamed. The reason of this discrepancy is, that inflammation of the upper lobes is the most frequently fatal; hence Chomel, although out of fifty-nine dissections he found the inflammation occupying the apex in thirteen, the base in eleven, and the whole or central parts in the other cases, does not withhold his assent from the decision of Laennec. That the right lung is more frequently inflamed than the left, is agreed on by all writers, and is proved equally by examition of the physical signs and by dissection.

[From the combined observations of several distinguished pathologists, it would appear, that in 1430 cases, the right lung was concerned in 742; the left in 426: and in 262 the pneumonia was *double*, or affected both lungs. It is probable, however, as has been suggested by Dr. Stokes, (*On Diseases of the Chest*, 2d Amer. edit. p. 272, Phil. 1844,) that the proportion of cases of double pneumonia is under-rated in this estimate. It is very much more common in young children, and in old persons, than in adults. Of 128 cases, observed in infancy,—according to MM. Valleix and Vernois,—the disease occurred in the right lung in 17 cases; in the left, in no case; and the pneumonia was double in 111 cases. Of these 111 cases, the disease predominated on the right side 59 times; on the left 10 times; and in 42 cases it was equal on both sides. (Rilliet and Barthez, *Traité Clinique et Pratique des Maladies des Enfans*, tom. i., Paris, 1843.)]

Inflammation not unfrequently attacks single, or a few isolated lobules, being abruptly limited by the interlobular cellular tissue, so that lozenge-shaped or polygonal patches of red, engorged or hepatized tissue are found in the midst of healthy structure. The same distinction is sometimes exhibited in the degree to which the inflammation has advanced, some lobules of light, purulent infiltration appearing in a livid engorgement. The inflammation in lobular pneumonia seems to originate in several points at once, and not to be sufficiently intense to traverse the barrier of the interlobular membrane. It is this form that supervenes frequently to great surgical operations or severe accidents, and it is common in children.

Andral has distinguished another variety of acute peripneumony, which, as he supposes it to affect individual air-cells or vesicles, he calls vesi-

cular. This presents itself to the anatomist in the form of little red spots, varying in size from that of a pin's head to that of a hemp-seed, and in colour from blood red to livid red: they are often more fragile than the rest of the tissue, which is sometimes quite healthy, but in many instances contains the miliary granulations of Bayle. This form of inflammation is not common, and requires a light colour of the lung to make it distinct; but we have observed it sufficiently to enable us to follow M. Andral in recognising it as a variety.

A considerable variety in the anatomical character of pneumonia is produced by the age of the subject. The lungs of young children are naturally more membranous and vascular than those of adults; and from this circumstance, and because the bronchi and vesicles are smaller, the texture is less light and crepitating to the feel. These characters are to be borne in mind when it is examined in an inflamed state, for they render the absence of crepitation and lightness, produced by this lesion, less apparent than in the adult. On the other hand, the colour, naturally light, of a pink, buff hue, makes the red appearance of inflammation more visible at this age. Pneumonia is seldom found so far advanced in children as in the adult. After many days' duration, it is often found only in the first stage, and its existence for weeks frequently does not bring it beyond the stage of hepatization. The division of the lungs into lobules is more apparent in children, and in the young of all animals than it is afterwards; which fact is an example of the progressive incorporation of elementary parts, which marks increasing perfection in the scale of organization. This anatomical difference appears to be the cause of the frequency of the lobular form of pneumonia in early life, and of the greater immunity from the inflammation which the interlobular texture often exhibits. The margins of the lobes are not uncommonly the only portions found hepatized in the lungs of children who have died of pneumonia supervening on hooping-cough.

[Instead of lobular pneumonia being confined to a single lobule, it often extends over many, constituting what has been termed *lobular pneumonia generalized*. As in the pneumonia of the adult, the morbid appearances may be divided into three stages. In the first, according to MM. Rilliet and Barthez, the cut surface of the lung is marbled with spots of a greyish rose, and red colour; these spots are more or less circumscribed, and are more readily torn than the healthy tissue, but they float in water; yield liquid, mixed with air, when pressed; and still crepitate. The *second* stage is the one most commonly met with, and resembles the hepatization of the adult; the *third*, or that of suppuration, requires careful examination to detect it—the substance of the lung having regained the greyish colour which belongs to its healthy state; but, by careful attention, some lobules are observed more prominent than the rest: they are not flaccid, like those around them, and, on pressure, they discharge a purulent fluid.

The appearances left by vesicular pneumonia may readily be confounded with the effects of phthisis. They have been accurately described by MM. Rilliet and Barthez. The lung is soft and flaccid, and is more or less collapsed, according to the extent of the lesion. Its section presents a great number of granulations of a yellowish-grey colour, and of about the size of millet-seed. These granulations differ in physical properties, as well as in nature, from crude miliary tubercles; the former containing a liquid—the latter forming solid masses. If the former be divided, they collapse immediately, giving issue to a drop of puriform fluid. MM. Rilliet and Barthez propose the term *vesicular bronchitis*, which, they think, expresses the nature of the affection better than its usual name, *vesicular pneumonia*. They consider the disease to be seated exclusively in the extreme bronchia; a certain number of pulmonary vesicles becoming inflamed, filled with pus, and dilated, without the surrounding cellular tissue being implicated. It is not easy to see, however, how these minute tubes can be inflamed to suppuration, without the inter-vesicular cellular tissue being more or less concerned. This, indeed, as elsewhere said, (*Practice of Medicine*, i. 397,) is, probably, the mode in which lobular pneumonia is produced.]

In old people, the prevalence of the black, pulmonary matter, and the rare, light, and often emphysematous texture of the lung, affect the character of the inflammatory appearances, the first two stages being darker and more dingy in colour, and the structure more readily disorganized and infiltrated with pus. Hence, whilst in children we see the suppurative process retarded by the density of the structure and the compactness of the effusion, in old people we sometimes find pus secreted in the second and even in the first stage before the red particles are removed; and this confusion of degrees is the more common where the pneumonia is of the congestive kind, as in typhous fever. Dr. Hope has given a drawing of a portion of lung from an old woman who died of typhous fever, which exhibited all the physical characters of purulent infiltration except the colour, which was a deep opaque chocolate. He says that he has frequently met with this state in the peripneumony of exhausted and cachectic subjects, especially after typhous fever.

Before describing anatomically some remarkable complications of pneumonia, we would stop for a moment on the question — what is the essential seat of pneumonia? Some pathologists, and among them Andral, place it in the air-vesicles and minute bronchi; others consider it to be in the interstitial cellular texture between these; whilst a third opinion supposes it to occupy all these indiscriminately. The writer, some years since, thus expressed his opinion: "Our knowledge of minute anatomy does not permit us to specify with certainty the exact and essential seat of this inflammation; but I am disposed, from a consideration of the signs and of the effects on the tissue, to refer it principally to the plexus of vessels and submucous tissue surrounding and uniting the minute extremities of the bronchi. It may, and usually does, extend to the mucous membrane of these extremities, and of the smaller bronchial tubes; but this is, *strictly* speaking, rather a bronchitus attendant on the parenchymatous in-

flammation, than a part of the pneumonia."* We have, since writing this, made many minute examinations of the lung in various forms of inflammation, and if they tend at all to modify this opinion, it is to the effect that the plexus of capillary vessels rather than any distinguishable texture, is the essential seat of pulmonary inflammation. On inspecting, by the aid of a simple lens, the margin of a slightly inflamed spot of lung, numerous vessels may be seen, distended with blood, passing across, around, and between the vesicles, with very little regard to their form or disposition; and as the scrutiny is extended to a part more inflamed, these vessels are so multiplied and confounded with each other as to be no longer separately discernible. In this state it is impossible to distinguish whether the tunics of the cells, or the tissues which connect them are most affected, for they all appear one mass of redness, in which are seen the cells irregularly diminished in size, and containing bloody serum with bubbles of air. The interstitial cellular texture, where it can be separately discerned, namely, between the lobules and around the larger bronchi, is generally less vascular and of a lighter colour than the other parts, and in some instances appears to be nearly free from the inflammation. The lining membrane of the minute bronchi, although generally of a deep red colour, is sometimes bluish red, as if from redness under it rather than in it; and on tracing these tubes higher, the presence of this inflammatory character is very uncertain. These examinations and some pathological considerations induce us to consider the capillary ramifications of the pulmonary artery and veins to be the proper seat of pneumonia, and that these may involve more or less of the tissues through and around which they pass. Thus through them the tunics of the air-cells, particularly the sub-mucous, commonly become the seat of inflammation; whence are formed the granulations of ordinary hepatization. When, again, the inflammation is confined more to the inter-vesicular plexus and tissue, which appears to be the case in the more congestive form of inflammation, where vessels larger than capillaries are involved, the uniform non-granular form of hepatization which we have before described, is produced.† If, as is commonly the case, the inflammation extends to the extremities of the bronchial arteries, which are said by anatomists to anastomose with the pulmonary, the mucous membrane lining the vesicles and minute bronchi partakes of the inflammatory action, and exhibits it in the manner peculiar to mucous membranes by the secretion of a viscid mucus, and afterwards of pus. So, likewise, when the inflammation reaches the surface of the lung, it is generally, but not constantly, propagated to that portion of the pleura which invests it and derives its vessels from it; and this extension of the inflammation may add another character to such instances of the disease. But it is its seat in these extensive capillaries of the lungs through which the blood of the whole system is continually passing,—it is this affection of so considerable and important a portion of the circulatory system that causes the severe and intense character of pneumonic inflammation; and the more constantly we hold this in view, the better shall we understand the pathological history of the disease, and its important relation to remedial measures.

We have just mentioned the extension of inflammation to the pleural covering of the lung; this occurs so frequently that some writers have used the terms pneumonia and pleuro-pneumonia as synonymous. But in the ordinary cases of pneumonia the pleuritic affection is so slight that it scarcely modifies the disease, and like the inflammation of the bronchi, which is as usual an accompaniment of pneumonia, is to be viewed as incidental rather than essential in the disease. In these cases the pleuritic inflammation will show itself to be modified by the seat and extent of the pulmonary disease. When this is partial, that portion of the pleura which covers it has upon it an albuminous deposit, which is generally thin, and if the disease has been of sufficient duration, shows signs of organization. The corresponding portion of the costal pleura frequently presents a similar deposit; an instance of that propagation of inflammation by contiguity which seems to assimilate the proximate cause of inflammation to something more subtle and mobile than the common properties of texture, and to bring it into close analogy with electric agencies. These albuminous effusions are the basis of false membranes, which form adhesions between the lung and the costal pleura. Underneath them the membrane exhibits points and patches of red, as in ordinary pleurisy. When the pulmonary inflammation is of small extent, there is commonly a small sero-purulent effusion into the pleural sac; but extensive hepatization prevents this from taking place, by filling the pleural cavity with its own unyielding substance, and the lung is then partially covered with a thin false membrane, which is thicker along the edges, in the inter-lobular fissure, and occasionally at some points where the inflammation was first extended to the pleura. (Transl. of Laennec, p. 487.) These circumstances prove the greater intensity of the pulmonary inflammation, and constitute the reason given by Laennec for not calling such a complication a true pleuro-pneumony.

There is another remarkable combination of pleurisy and pneumonia, in which the former, with an abundant liquid effusion, has the predominance, and signally modifies the effect of the inflammation on the tissue of the lung. The pneumonia is generally circumscribed, sometimes lobular, and is often seen in several distinct spots at the lower parts of the lung. Laennec describes the hepatization under these circumstances to be much more flabby and less solid than in simple pneumonia. It is of a red or livid red colour, and destitute of granulations or other trace

* A Rational Exposition of the Signs of Diseases of the Lungs and Pleura, by Charles J. B. Williams, M. D. 1828, p. 80.

† An uncommon effect of pneumonia has, since writing the above, been brought under our notice by Dr. Stokes, in a recent number of the Dublin Medical Journal. A part of the lung was in the third stage; and the suppuration, instead of prevailing most in the tunics of the bronchi and vesicles, had scarcely affected them, but had destroyed the interstitial tissues, so that the vesicles presented the appearance of bunches of little grapes or berries. We need not remark how much this fact confirms the view which we take of the occasional diversity in the principal seat of pneumonic inflammation.

of air-cells; but the vessels and bronchial tubes are still conspicuous in it. It contains no air, and not more moisture than muscle; from its resemblance in compactness and suppleness to this tissue, Laennec distinguishes it by the term *carnification*. In a case of this kind, which we have recently seen, we could not but recognise in this carnified state of the lung the uniform, non-granular hepatization which we have described as that in which the interstitial plexus and tissue are the only seat of the inflammation; and this variety of consolidation, which is arrested or restrained by the pressure of the pleuritic effusion, appears to be another proof that the essential seat of pneumonia is not in the air-cells. It exhibits the essential effects of pneumonic inflammation in colour and solidification, without the granulations and humidity which are fortuitous and dependent on effusion extending to the walls of the yielding air-cells. As it might be expected, the progress of this form of pneumonia is slow, and rarely reaches the suppurative stage; but Laennec says that in subjects who had died in from one to three weeks after the subsidence of inflammatory symptoms, he has found "the affected portions of the lung flabby, dry, and yellowish, with the vesicular texture discoverable in some places, but the vesicles apparently filled with a half concrete pus." It has been remarked by Dr. Stack that this compressed state of the lung is sometimes perpetuated by false membranes, the product of the pleurisy, binding it down. (Dublin Hospital Reports, vol. iv. p. 90.) This we have seen exemplified more than once: in one case illustrative of such an effect of a false membrane, a pneumothorax had supervened on the absorption of the liquid effusion. (Rational Expos. &c., p. 143.)

Laennec calls that only true pleuro-pneumonia in which both diseases are extensive, there being copious pleuritic effusion, with a considerable extent of peripneumonia. Such a combination is of rare occurrence, and as there is only a difference of degrees, it does not appear why this alone should be entitled to the compound name.

The anatomical characters of resolution or cure of peripneumony are worthy of remark; they are particularly described by Laennec. When recovering from the first stage, the pulmonary tissue becomes drier and more filled with air, but for some time retains its red colour, as if dyed. Sometimes the texture continues for a while to be œdematous. A hepatized portion in progress towards cure assumes a paler hue, passing through shades of red grey and reddish flax colour, until it become a little redder only than natural. The texture at the same time becomes more yielding and moister, containing a frothy serum, which abounds more and more in air as the resolution advances, the granulations giving place to the development of the air-filled vesicles. These changes begin at several points, and, when advanced, often leave others still hepatized. When the tissue resumes its natural dryness and colour, it remains firmer, more elastic, and heavier for some time after. The first signs of restoration from the third stage are the yellow tinge becoming lighter, and the pus more liquid by the intermixture of serum; air-bubbles afterwards appear and continue to increase, while the pus is reduced to small specks. As the vesicular texture returns, it resembles the first stage of engorgement in all respects but colour, which appears on incision to be dirty yellow or greenish, and this continues even after the complete reabsorption of the serum The anatomical history of the process of cure of gangrene of the lungs will be found in the article Mortification.

III. Pathological History of Pneumonia.

Operation of Causes. — Pneumonia is the most frequent of all the parenchymatous inflammations. This in part proceeds from the very vascular structure of the lungs, which renders them very susceptible of inflammation; but we also see a reason in the nature of their function, which peculiarly exposes them to suffer from the various influences that injure the balance of the circulation. Whatever view is taken respecting the generation of heat, it is sufficiently established by experiment that the function of the lungs is intimately connected with it, and that the application of any cooling influence to the body makes a demand on an increased activity of this function. As, under such influence, the blood returns freely to the lungs in a state more highly venous than usual, there is a greater necessity for respiration, and both this increased flux and the consequent augmented activity bring this organ into a condition peculiarly favourable to the development of inflammation. If the application of cold be not long continued, the pulmonary congestion may soon be removed by the due oxygenation of the blood, and consequent restoration of the balance of the circulation, before the tonicity of the pulmonary vessels has materially suffered; some minor part of the circulation, as that of the bronchial membrane, occasionally alone being the seat of inflammatory reaction. But if the cold be severe and long continued, if a large portion of the body, especially the chest, be exposed to it, the pulmonary vessels suffer not only from their increased task and the congestion consequent on its imperfect completion, but likewise from the sedative influence of the cold directly affecting them; hence, whenever reaction is established, they are the parts most likely to suffer from its effects. The manner in which excessive exertion and the inhalation of asphyxiating gases and vapours excite the disease is obviously likewise by the congested state which they occasion in the vessels, which, if sufficiently continued, only requires the addition of a subsequent reactive excitement to convert it into inflammation. Alcohol and its various compounds also act as occasional exciting causes of pneumonia by their narcotic influence on the nervous system, by which the sensation of want of breath that excites the respiratory act is blunted, and a congestion of blood takes place in the lungs in consequence of their insufficient action. How far in these several instances the stasis of highly venous blood in the pulmonary vessels may contribute to injure the tenacity of their coats, and thus to render them peculiarly obnoxious to the consequent reaction, is only a matter of conjecture, not unsupported by analogy.

The presence in the body of various poisons, as that of the rattlesnake and deleterious fungi, may lead to the production of pneumonia partly in the same way, but probably also from a speci-

fically injurious influence on the pulmonary vessels. There is no organ in the body so intimately exposed to the influence of the blood as are the lungs; the whole circulating mass passes rapidly through their fine vascular filter, and if there be a noxious ingredient in the blood, it may be reasonably expected here to show its effects. Hence the origin of pneumonia, not only from the poisonous influences just named, but probably also, as Laennec has surmised, from the more subtle ones of an epidemic nature. The inflammations arising in the course of various febrile and exanthematous diseases may owe their existence in some degree to a similar mode of influence; but the tendency of the phlogistic reaction to localize itself in parts predisposed to inflammation in many of these disorders, is likewise a link in the chain of causes, which must not be withheld from our recollection. In eruptive fevers particularly, it is common, as Andral has remarked, (Clin. Méd. tom. ii. p. 287,) to see a great degree of dyspnœa precede the appearance of the eruption, and generally cease, as if by magic, when this fully takes place. In some cases, however, and especially where the eruption recedes or is not fully thrown out, the dyspnœa continues, and assumes the character of a more permanent disease. This is obviously a congestion persisting and becoming converted by general vascular excitement into an inflammation. The deficient resonance of the chest, remarked by Avenbrugger and Corvisart at the commencement of eruptive fevers, is a physical indication of this pulmonary congestion.

The intercurrence of pneumonia with other inflammatory diseases of the lungs and neighbouring parts will admit of a more direct explanation: it is an extension of inflammation by contiguity, and arises from some additional external cause, as when bronchitis or pertussis becomes a pneumonia in consequence of exposure to cold; or from an additional internal movement, as when, in consequence of a checked excretion or a too well nourished mass of blood, such slight or membranous inflammation spread and infest the more considerable circulation of the parenchyma. The remarkable tendency which is exhibited among children to such a propagation of inflammation is dependent on the greater proportion of membrane and vascularity of the lungs, as well as on the higher activity of their function at that early age; facts pointed out by Magendie and Laennec, and strictly corresponding with the rapid progress of diseases of these organs at that period. The frequent intercurrence of pneumonia with hooping-cough appears to depend not merely on a propagation of inflammation; the congested state of the lungs induced by the cough and imperfect oxygenation of the blood has likewise its share in favouring the development of inflammation.

The metastasis of the inflammation of gout and rheumatism occasionally falls on the lungs, but seldom without some predisposition to disease in the organ, from previous attacks of inflammation; and there is nothing in these instances which tends to throw new light on this obscure point of pathology. Whether these, and likewise the cases of pneumonia supervening after severe accidents and surgical operations, noticed by Guthrie, Bell, Dupuytren, and others, are connected with an altered condition of the circulating fluids, is a question which cannot at present be placed on any other than the ground of conjecture.

Tubercles and apoplectic engorgements in the lungs may excite inflammation both by their irritating influence, and likewise, if they are numerous or extensive, by the obstruction which they occasion in the circulation, and which leads to the congested state which we have so frequently observed to favour the development of inflammation. The points adjoining tubercular excavations are likewise occasionally attacked with inflammation. It is to be remarked of these and other inflammations which originate chiefly from mere local irritation, that they are much less severe and permanent than those in which the system at large is more concerned, and the inflammation is as it were the focus of a general derangement. Accordingly it is observed that such intercurrent peripneumonies are commonly slight, and, if recognised, yield readily to treatment. But their latent character constitutes their worst feature, their symptoms being merely a slight exacerbation of those of the pre-existent disease; and unless detected through the aid of their physical signs, they may speedily prove fatal.

In reviewing the pathological relations of the causes of pneumonia, we cannot avoid noticing the important link which congestion of blood in the lungs forms in the development of the inflammation. In by far the majority of cases this congestion is immediately determined by the operation of the exciting cause, and precedes what may be termed the irritative stage of the inflammation. Such we have seen to be the effect of cold extensively applied, of violent and long-continued exertion, of certain poisonous influences, (which, by diminishing the sensibility of the nervous system, impair that sensation of want of breath which excites the respiratory act,) and of the congestive stages of various febrile diseases. The connection of congestion with inflammation is still more forcibly illustrated in the pneumonia of the moribund, in which the blood, imperfectly oxygenated through the failure of the respiratory forces, accumulates in the pulmonary vessels, which even then become the seat of inflammatory action, and if the agony or change of death be of long duration, produce those changes which are recognised as the results of ordinary pneumonia. This point has been fully established by Laennec and Louis. The latter found signs of partial inflammation in 22 out of 112 cases which died of various chronic diseases, and in which the inflammation could have existed only a few days before death. (Rech. sur la Phthisie, p. 39.) Laennec not only found proofs in the dead body, but likewise repeatedly discovered signs of this inflammation supervening during the failure of the powers before dissolution in various diseases. Seeing, then, the close relation which simple congestion, or passive hyperæmia, (as Andral terms it,) of the lungs bears to inflammation, so close that their anatomical distinctions cannot be discerned, it remains for inquiry what is the additional pathological movement which gives to inflammation its character and permanency, and renders it more than simple

hyperæmia. In answering this question by asserting that it is a reaction of the neighbouring arteries and of the heart, we only describe a phenomenon which does succeed and which is the next of a series of actions constituting the disease in question. This is the irritative stage, and is in most examples posterior to the formation of a congested state of the vessels. In some instances, however, as where inflammation succeeds to a wound or other mechanical injury of the lung or other irritation in its substance, the afflux of blood is posterior to the irritation, which is then the starting point of the pathological changes. In the article IRRITATION we have already described an afflux of blood as generally following an excitement of a part, and it does so the more certainly and fully in proportion as the organ is vascular and freely supplied with blood; hence the lungs are peculiarly liable to the congestion of irritation, and if the cause be applied for a sufficient length of time, this congestion may become inflammation. We do not here stop to trace the progressive changes and reaction which accompany the development of inflammation in general; these are sufficiently dwelt upon in the article on that subject; but in considering the lungs as an object of inflammatory action, it cannot escape our observation that their vicinity to the heart, their great congeries of vessels through which the whole blood of the body passes, their spongy and yielding texture, all tend greatly to increase the delicacy of the balance of their circulation, and render any disorder of this balance peculiarly liable to those reactive processes of the principal circulation which form a part of inflammation and fever.

Physical Signs of Pneumonia.—Through the aid of auscultation and percussion we obtain a better knowledge of the pathological process of pneumonia than can be obtained in any other way, for through their means we in a measure apply our senses to the very seat of the disease; but there is still some degree of doubt about the precise mechanism of certain of these signs, and this obscurity leaves us uncertain as to some minute points of the pathological progress of the disease, which we have already found not clearly determined by their anatomical history. We shall, however, describe the signs as they have been accurately observed, and afterwards state the view of the pathology to which they, together with the anatomical characters of the disease, appear most rationally to lead.

On the first invasion of inflammation of the lungs, contemporaneously with the earliest of the general symptoms before described, the ear unaided, or through the stethoscope, will perceive in some part of the chest a peculiar sound accompanying the usual respiratory murmur: it is a fine crackling or crepitating sound, like that produced when kitchen salt is thrown on a heated iron; or like the crepitation which occurs when a healthy lung is pressed between the fingers. A pretty correct idea of the sound may also be obtained in a readier manner by rubbing between the finger and thumb a lock of one's own hair close to the ear. This is the *crepitani rhonchus*, and was considered by Laennec to be pathognomonic of the first stage of pneumonia. The space where it can be heard is often at first very limited, sometimes not extending more than an inch or two; but when more advanced, it may occupy nearly a whole lung. The parts where it is most commonly first heard are, below the inferior margin of the scapula, below the axilla, or about the lower margin of the pectoral muscle, points corresponding with the lower lobes of the lungs, which, as we have before noticed, are the most frequent seat of inflammation; but it is occasionally met with in other parts of the chest. At the commencement of inflammation, the crepitation is merely an *addition* to the ordinary respiratory sound, which is still distinct; but as the disease proceeds, the crepitant rhonchus prevails more and more, until it is the only sound heard in that spot during the respiratory movements.

At this period the part begins to sound a little duller on percussion than the corresponding opposite point, particularly if this be practised mediately, with M. Piorry's plate, or even on one of the fingers of the left hand pressed closely on the chest. The progress of the inflammation is marked by the minute crepitations constituting the rhonchus becoming less continuous and regular, and being confined principally to the end of each inspiration; and as the lung begins to pass into the state of hepatization, they are heard only on coughing or on deep inspiration, and at last cease entirely. If the disease is extensive, in proportion as the crepitant rhonchus diminishes, the respiration in the sound part of the lungs becomes louder than usual, and like that of children, whence it is called by Laennec *puerile respiration*. In the second stage of pneumonia, if the disease is extensive, the sound emitted on the percussion of the part of the chest corresponding with the hepatized portion, is quite dull, and yields no more resonance than the region of the liver. On applying the ear, neither the ordinary respiratory murmur, nor the crepitant rhonchus of the first stage is heard; but sometimes another kind of sound is substituted for them, and this occurs most commonly in proportion as the hepatization approaches the middle parts and root of the lobes, and extends to the surface. This is a whiffing sound, resembling that produced by blowing through a crow's quill, and it is occasionally so loud as almost to amount to a whistle. This is the *bronchial respiration* of Andral and Laennec, and in its acute and defined character forms a remarkable contrast with the dull diffused murmur of natural respiration. It is often heard most distinctly during the forcible respiration of coughing. A peculiar resonance of the voice, called by Laennec *bronchophony*, is less commonly observed at the same points. The voice resounds at the end of the stethoscope in a modified tone, as if it came through little tubes. It does not, as in perfect pectoriloquy, appear to originate in the stethoscope, and it is not heard in distinct words, but in notes of various continuance, not always synchronous with the words uttered by the mouth, and at intervals is alternated with what may be called whiffs of the bronchial respiration. With these several sounds there is often mixed a mucous rhonchus or fine gurgling, but this seems circumscribed and does not obscure the others.

[M. Hourmann has pointed out another pheno-

menon which, as suggested by M. Chomel, (*Dict. de Méd.* 2d edit. xxv. 173,) might be useful in cases in which the feebleness of the patient's voice might not permit bronchophony to be heard, and which consists in a greater resonance of the observer's own voice, (*retentissement autophonique*,) when he speaks with his ear accurately applied to the chest opposite the seat of the hepatization. (See Auscultation.)]

The puffing or blowing sound of bronchial respiration sometimes gives the auditory sensation of a person blowing into the ear through a narrow tube; and as this sound is sometimes interrupted, and occurs in irregular puffs or whiffs, it gives the impression of a movable veil or loose curtain fluctuating under the impulse of the air.

[At times, solidification occurs rapidly, without being preceded by the usual signs,—the lung passing, in the course of a few hours, from apparent health, according to every physical sign, to solidification. Signs of sudden solidification, without preceding crepitating rhonchus, have been regarded pathognomonic of pleurisy with effusion, yet they are equally indicative of the condition just described. The principal diagnosis between this *typhoid solidity* and a pleural effusion, as remarked by Dr. Stokes, (*Op. cit.*), is, that with the dulness and absence of respiration accompanying a considerable effusion, the signs of excentric displacement are wanting; the heart is not displaced; the epigastrium and hypochondria are concave, and the intercostal muscles unaffected.]

In the third or suppurative stage, in addition to the dulness on percussion observed in the second stage, there is sometimes a coarse mucous rhonchus, heard especially at the root of the lungs or about the lower axillary or mammary regions: this is the only physical sign of the termination of the inflammation in this stage; and when it is observed to commence in a part where bronchial respiration and resonance have been previously heard, it may be taken as a pretty certain proof of the supervention of this change. Sometimes, however, the bronchial respiration and resonance continue without this sign, and there is then no physical indication of the occurrence of the third stage.

If the suppuration becomes complete, by the formation of an abscess in any portion of the lung, no physical indication of this event presents itself until the purulent matter has been partly expectorated. In that case a gurgling or cavernous rhonchus will be heard in the corresponding point; and when the evacuation of the liquid contents of the abscess has been further completed, this rhonchus will give place to the *hollow cavernous respiration* or *pectoriloquy*, indicating a cavity communicating with the bronchi. If, however, the abscess is very large, it may leave a cavity in which the *metallic tinkling or amphoric resonance* is produced, precisely as these phenomena are developed in phthisis after the evacuation of the contents of tubercular vomicæ. The gangrenous termination of peripneumony will announce itself by the putrid fetor of the breath and of the matter expectorated; and in case the gangrenous portion is detached, whether in a circumscribed slough, or in a diffused deliquium, the same signs of a cavity may be produced as in abscess of the lungs.

Such are the physical signs which the most accurate observers have concurred in attributing to peripneumony and its consequences in their simpler forms. We shall better understand their nature as well as the varieties to which they are subject, if we examine them more rationally, in relation to the other symptoms, and to the effects of the inflammation anatomically discovered in the tissue. With respect to the crepitant rhonchus, there can be no doubt that its seat is in the minutest order of bronchi and air-cells of the lungs, since it is only diseases which affect these parts that present this or any sound resembling it. But the precise manner in which they are affected in order to produce this sound is not quite so certain, and different opinions upon it have been entertained. M. Andral considers the crepitant rhonchus to be nothing more than a finer modification of the mucous rhonchus; the latter becoming crepitant when its seat is in the minutest bronchi and air-cells, the narrow dimensions of which render the bubbles which compose it finer and more equal. Hence he asserts that the crepitant rhonchus is produced by the intermixture of air and liquid in the air-cells and smallest bronchi in other diseases as well as in pneumonia, and that it occurs in acute bronchitis whenever the inflammation and excessive secretion extend to these parts. Although he absolutely denies the accuracy of this statement, Laennec does not appear to have clearly made up his mind as to the cause of the crepitant rhonchus of peripneumony. Speaking of this sound in one place, he says: Besides the sound of crepitation, a sensation of humidity in the part is clearly conveyed. We feel that the pulmonary cells contain a watery fluid as well as air, and that the intermixture of the two fluids produces bubbles of extreme minuteness."—"In respect of the size of the bubbles in the different rattles, they may be estimated as *very large, large, middling, small.* The last term is especially applicable to the crepitous rattle of peripneumony, in which it seems as if an infinity of minute equal-sized bubbles, formed at once, were thrilling or vibrating, rather than boiling on the surface of a fluid." (Dr. Forbes's Translation, p. 52.) In another place, however, he says that at the invasion of the inflammation, the crepitation "conveys the notion of very small equal-sized bubbles, and seems hardly to possess the character of humidity." (Op. cit. p. 212.) These opinions are equally inconsistent with each other, and with his observation on the certitude with which he strenuously insisted that simple acute bronchitis never presented this sign; for truly, if the intermixture of air and liquid in the minute bronchi were the only elements of the crepitant rhonchus, this disease as well as pituitary catarrh, which certainly present this condition, ought in an equal degree to produce this sound. Such, however, was the fine accuracy of Laennec's observation, (as, during the last year of his life when he was most perfect in his art, we had personally ample opportunities of proving,) that we do not hesitate to receive his testimony on this point as the most exact, whatever inconsistency may appear in his reasonings upon it; and therefore, although we cannot pretend to such a perceptive acumen as to be able always to distinguish the crepitant from the mu-

cous rhonchus in all their modifications and gradations, we assume the authority of the great auscultator as a proof in addition to others, that these two sounds are essentially different in their nature, and owe their characters to peculiarities in the mechanism which produces them.

It is agreed on by all auscultators, that œdema of the lungs and the margins of hæmoptoic engorgements may produce a rhonchus of the crepitant kind, and it naturally occurs to us that these lesions resemble pneumonic engorgement in the pressure to which they subject the vesicular parenchyma. If we compare with these instances the very close representation of the crepitant rhonchus which the simple pressure of a healthy lung will produce, we are led at once to an explanation of the mechanism of this sign. By this pressure the air is expressed from the tissue, whilst the tubes and cells are so narrowed by the pressure that it can only pass out of them in successive bubbles, the escape of each of which produces a minute crepitation: this sound Laennec tells us differs from the crepitant rhonchus only in being not so strong; here no preternatural fluid is present in the air-cells. In œdema, or in effusion of blood into the substance of the lungs, we have the interstitial effusion and narrowing of the minute air-tubes, and cells, and from the nature of the expectoration we may conclude that there is also an increase of liquid within them; the rhonchus that accompanies them is accordingly described by Laennec to consist of moister and somewhat larger bubbles than that of peripneumony, and he terms it subcrepitous. Lastly, we have the peripneumonic engorgement, in which anatomy assures us that there is the same narrowing of the air-tubes and cells by the swelling of the interstitial blood-vessels, whilst the observation of the sputa leads us to conclude that the interior of these tubes and cells is lined with a viscid secretion; this produces the drier and stronger sound of the genuine pneumonic crepitation. This is in principle the same explanation which we advanced some years since in the following passage: "The distended vessels, and the serous effusion in the interstices, press on the minutest brenchial ramifications, and partially obstruct the ingress of air into the cells to which they lead; whilst the viscid secretion of the mucous membrane simultaneously inflamed, filling the calibre of the tubes thus narrowed, only yields to the air in respiration forcing its way through it in successive bubbles. This bubbling passage of air through a viscid liquid contained in an infinity of tubes of equally diminished calibre, causes that regular and equable crepitation which constitutes the true *rhonchus crepitans*." (Rational Exposition, &c. p. 81.) We were led to doubt the accuracy of the explanation of Andral and Laennec, from the circumstance that the character of the expectoration in pneumonia does not countenance the supposition that there is during life any other secretion into the air-cells than the characteristic viscid secretion of the mucous membrane which lines them. In a former article we have pointed out the tendency which the natural respiratory movements have to throw all superfluous secretion from the smallest bronchi into the larger until they are brought under the influence of the act of expectoration. (See Expectoration.) Now if, as those who found their opinions solely on morbid anatomy maintain, there were a serous effusion into the air-cells in the first stage of pneumonia, there ought to be more or less of this serum mixed with the sputa as in some cases of pulmonary œdema: this is not the case, for the expectoration is a glutinous mucus from the onset of the inflammation, and instead of becoming more serous, increases in viscidity as the inflammation becomes more vehement. Moreover, we venture to follow the example of Laennec in asserting that there is a mucous or liquid rhonchus of the fine bronchial ramification, the character of which is sufficiently distinct from the rhonchus of pneumonia to merit its separation in kind as well as in degree from the latter sign. This fine mucous rhonchus, which we have observed in pituitary catarrh, and in the general bronchitis accompanying continued fever, occupying the base of the lungs, the common seat of the crepitant rhonchus, is distinguished from this latter in the greater inequality of the bubbles which compose it; they appear to roll through a liquid without breaking with that regularity which distinguishes the crepitation in pneumonia; there are, besides, little hissing or whistling sounds mixed with them, which convey to the mind the impression of a movable proportion of air and liquid in the tubes. If this mucous rhonchus is to be distinguished from the subcrepitant of pulmonary œdema and apoplexy, it is by the greater irregularity of the minute sounds which constitute it; but we cannot pretend to assert that this distinction is always possible from the nature of the sound, nor can we deny that there are gradations and combinations of the two rhonchi which entirely baffle our power of discrimination. But we do maintain that the crepitant rhonchus of peripneumony is, with few exceptions, sufficiently characterized by its pure equable crepitation, unmixed with hissing or any sounds of liquid, to render it a valuable and available means of distinguishing this disease in its earlier stages.

In conceiving the mechanism of this rhonchus according to the explanation given above, we must take into account the force with which the air passes through the narrowed tubes, and we shall then perceive why the bubbles crepitate drily, and the liquid is not carried before the air passing to and fro, as it would be were its viscidity less and its quantity greater. It has been asserted that the crepitation of peripneumony may be imitated by the bursting of bubbles on the surface of fluids of the tenacity of serum, and hence it is concluded that the crepitant rhonchus depends on the mixture of air with such a fluid in the lungs; but the cases are by no means analogous: in the one, the bubbles rise and burst merely from their own levity; in the other, an active moving force is constantly driving and breaking them through an infinity of minute tubes. On the whole, then, the more we have examined and reflected on the subject, the more we are convinced that the physical cause of the crepitation of peripneumony is the forcible passage of air through narrowed passages lined with a viscid liquid; and if we modify at all the explanation formerly given, it would be

that we have not the ground to confine the crepitation to the minute tubes only, but that it probably occurs in the air-cells likewise.

We can readily perceive how the various degrees of this rhonchus become an accurate measure of the progress of the inflammation. Thus, when this is most moderate, the air enters many tubes still without obstruction or crepitation, and the natural sound of respiration is heard together with the crepitant rhonchus; but when the narrowing of the tubes and cells and the viscid secretion lining them, become more universal in the part, no air enters there without this crepitation being produced, and this rhonchus is then heard pure and unmixed. The next change is the gradual diminution of these crepitations, owing to the increased swelling of the coats of the air-cells, or of the interstitial tissues. Anatomical investigation teaches us that at this period there is a deposition of a semi-solid lymph or albumen; this appears to cause such a successive obliteration of the tubes and cells as entirely to obstruct the entry of air into them. Accordingly, as the lung passes from the first stage of inflammation into the hepatized state, the crepitations become fewer, are heard only at the acme of inspiration, or during the forcible efforts of coughing, and at length cease altogether.

The physical cause of the bronchial respiration and resonance is more obvious. The deposition of albuminous matter in the parenchyma of the lung has the effect, as we have just seen, of obliterating the spongy structure, and converts it into a solid mass. In the healthy state, the different density of its materials (air, membrane, and liquid) prevents the transmission of sounds from the interior to the surface; but now that this density is rendered uniform, it propagates the sound of the air passing to and fro in the larger bronchial ramifications of the interior; and during the exercise of the voice, its resonance also traverses the hepatized substance in a similar manner. It is obvious, therefore, that the extent and intensity of these sounds must greatly depend on the number and size of the bronchial tubes involved in the hepatized portion; hence they are most distinct when the inflammation occupies the summit, root, or central parts of the lung, and extends to the surface; but when the lower, the central, or the superficial portions are alone affected, they may be altogether wanting. When the principal part of a lung is hepatized, including the central portions, which contain many considerable bronchi, a noisy resonance of the voice, almost amounting to pectoriloquy, is heard in the scapular region, in the central parts of the axilla, or about the lower margin of the pectoral muscle, but it may be generally distinguished from imperfect pectoriloquy by its more diffused character, and from that of the perfect kind by the indistinctness of the words uttered. The puffing or fluctuating sound of bronchial respiration and bronchophony, which we have mentioned as sometimes met with, is referred by Laennec to a thin portion of healthy and crepitant lung immediately on the surface and between the hepatized portion; and if this observation is exact, the cause of this irregular puffing seems to be the air entering or leaving this healthy portion, and thereby changing the degrees in which the sound from the interior is transmitted through it.

We have mentioned the supervention of a liquid mucous or gurgling rhonchus as the only physical indication of the occurrence of the third or suppurative stage. This sign is the proof of that softening and deliquescence of parts which mark the process of suppuration in all its forms, but we do not obtain from it any further light on the intimate nature of this termination of inflammation. The more liquid form of the expectoration generally corresponds with the presence of the mucous rhonchus; sometimes, when there is little or no expectoration, the bronchial respiration and bronchophony continue in this stage.

The physical signs of abscess and gangrene sufficiently explain themselves; they apply only to the cases where a cavity has been produced by the more or less perfect evacuation of the gangrenous or suppurated parts; and are, first, the coarse bubbling rhonchus, and afterwards, more rarely, the cavernous respiration and resonance, or pectoriloquy, which are described as the signs of tubercular cavities in phthisis. (See Tubercular Phthisis.) In the uncommon case of a large abscess, there may be the metallic tinkling instead of these signs. In the work formerly quoted will be found the only explanation that has been given of this sign, and this explanation has enabled us to generalize with success on the cases of its production, but it has too little connection with our present subject to require an exposition here. (Rational Exposition, &c., p. 136.) If the abscess or the sloughy portion of the lung has not been evacuated, auscultation teaches us nothing of the presence of either. Fetidity of the breath, especially in coughing, and of the expectoration, is the only physical sign of gangrene of the lungs. This may occur, however, in simple bronchitis, and it is only where auscultation has detected signs of pneumonia that it can be admitted as a proof of the death of a portion of the pulmonary tissue.

We have hitherto considered the general type of the physical signs of pneumonia in its most simple state, and we need say little on the varieties contingent on the situation or extent that the disease occupies. If it be confined to the central part of the lung, the spongy tissue of the surface may prevent the various sounds generated in the inflamed portion from reaching the ear; and this, we apprehend, happens far more frequently to auscultators in general than it did to Laennec, who states that he only met with one case of pneumonia where the stethoscopic signs were wanting; that he could detect a central spot of inflammation, not exceeding the size of a filbert, by the distant deep-seated crepitation, or bronchial respiration, heard beyond the pure murmur of the surface. It requires a very fine ear and considerable experience in auscultation to discover these signs at all in many cases of central pneumonia; and we believe, with Dr. Forbes, who made a similar comment, that it is expecting too much of auscultation to suppose it infallible in detecting every degree of pulmonary disease.

It has always appeared to us, that the more the student in auscultation holds in view the pathological state on which the signs depend, rather than

those signs themselves, and habitually reflects on their physical mechanism, as far as it is known, without empirically dwelling on names or bare descriptions of sound, the more surely will he estimate the value of this method of diagnosis, and the more instruction will he receive from it. He will thus see that central peripneumony may be so situated as to yield sometimes no physical symptom, and at others those to be discovered only by a very careful examination; and hence he will see the impropriety of a partial method of diagnosis, and the great importance of attending to the sputa and other indications. When the inflammation is extensive, all these difficulties vanish, and the more intense and puerile respiration in the sound portions of the lung, depending on the more rapid and forcible passage of air in them, further shows the infringement that has been made on the proper function of the organ.

It is not uncommon, especially in partial peripneumony, to observe the signs of the several stages of inflammation co-existent in different parts of the lung. Generally, the base or lower lobe, the part most liable to inflammation, presents its greatest degree, being hepatized, and yielding no sound of respiration or resonance on percussion; a little higher are heard the bronchial respiration and resonance, and above that the crepitant rhonchus, which mixes with and gradually gives place to the puerile respiration which occupies the upper parts of the lung. More rarely this order is reversed, the upper parts being the first and most affected. Bronchial respiration is particularly obvious when the hepatization affects the root or middle portions, without extending to the margins of the lobes; and the obvious reason of this is that there is still a passage of air through them to the sound parts.

The resolution or cure of peripneumony is marked by the reappearance, in a reversed order, of the signs which attended its progress. If the inflammation has reached only the first stage, engorgement, the resolution announces itself by the return of the respiratory sound, mixed with the crepitant rhonchus which before prevailed, and this pure vesicular murmur increases, whilst the crepitation diminishes, as the tissue becomes more free to the passage of the air. If the disease has proceeded to hepatization, the same recurrence of symptoms is observed; thus, in a spot where no sound of the ingress and egress of air had been heard, or perhaps only a bronchial respiration, a slight crepitation begins to be distinguished at the end of each inspiration, apparently produced by the air once more gaining admission through some of the fine bronchial tubes, whose calibres have been partially restored by the reabsorption of matter effused in and around their parietes. This sign, the *rhonchus crepitans redux* of Laennec, increases in intensity as the resolution proceeds; the bronchophony and bronchial respiration are diminished as the lung reacquires its spongy texture, and becomes a worse conductor of sound: after a while the natural respiratory murmur is heard mixed with the crepitant rhonchus, and as the texture becomes more permeable to the air, this increases as that diminishes, and the healthy state of the lung is thus gradually restored. It must be remarked, however, that this returning rhonchus differs slightly in character from that of incipient pneumonia, in its being less even in its crepitations; and as it increases in intensity, it gives more the sound of bubbles, resembling the mucous rhonchus, with which at this period it often becomes obviously mixed. The nature of the expectoration in retroceding pneumonia explains this difference, for we see in its diminished tenacity and more bronchitic character the reason why the crepitation ceases to be dry; and after a while, when their proper calibres are restored to the tubes and cells, the continuance of this secretion produces a simple mucous or bubbling rhonchus. We commonly, however, hear some crepitation in a part which has been inflamed, for some time after the resolution has apparently taken place; and this seems to indicate an œdematous state of the part, which we know in other instances to succeed to inflammation. If the inflammation has been of long continuance, especially if hepatization has existed for some time, the returning rhonchus is less regularly crepitant in its character; and if there be bronchial respiration present, this, instead of becoming diminished, is sometimes in a measure increased at first by the resolution. This fact, which has been also remarked by Drs. Graves and Stokes, (Dublin Hosp. Rep. vol. v.) seems to depend on the increased passage of air attending the reopening of the hepatized tissue before this has lost its good conducting power. The progressive change which supervenes, however, soon disguises this sound, not only by the tissue again becoming a bad conductor of sounds, but also by the bubbling or mucous rhonchus which generally occurs in a greater or less degree in the tubes which were before the seat of bronchial respiration. This change, compared with the free expectoration which commonly attends the resolution of pneumonia, exhibits a direct evidence of the interesting manner in which nature clears away effused matter from a tissue by free secretion from the adjacent membranes. When the hepatization has continued stationary for many days, the returning crepitant rhonchus is never so regular in its character as in more recent cases; and whilst in some points this rhonchus has appeared and already given place to one of a mucous kind, in others there is only a faint crepitation indicating a remarkable inequality in the progress of the resolution; some of these we should be disposed to view as cases of lobular pneumonia, in which the inflammation had commenced at several distinct points simultaneously; but in referring to the anatomical characters of the resolution of peripneumony before described, it will be seen that the restoration of the tissue to the healthy state is there seen to be also irregular and unequal, being probably modified by the degree of inflammatory orgasm in the different periods rather than by its absolute duration.

It is less easy to define whether any peculiar sign marks the restoration from the third stage, since we have no certain mark of the supervention of this stage. The coarse mucous rhonchus, which in fatal cases goes on increasing until it becomes tracheal and terminates the existence of the patient, in favourable cases becomes finer and less bubbling, in consequence of the free expec-

toration of the matter; and as this is secreted and cleared away, the air finds its entrance into the smaller bronchi and vesicles with a mixture of the mucous and crepitant rhonchi; these, in process of time, again yield to the natural vesicular respiration; but as may be expected from the degree to which the disease has attained, this restoration is very slow, and a subcrepitant rhonchus, depending on an œdematous state of the parts, often lingers for weeks after the other signs seem to indicate a removal of the peripneumony. The process of cure, after the formation of abscess, consists in the evacuation of its contents and its subsequent cicatrization. The signs of a cavity, the gurgling or cavernous rhonchus, or respiration, or pectoriloquy, therefore, gradually diminish until they nearly cease altogether; but there is generally left some dulness of the respiratory sound and of the resonance or percussion in the spot, often accompanied with a bronchial resonance, after the signs of cicatrization have appeared to be complete; and this is a natural consequence of the permanent modification which the disorganization has produced in the texture of the part. Laennec states that in several instances of abscess from partial peripneumony, which he observed in 1823, the cicatrization was completed within a period of from fifteen to forty days. In another patient who had pectoriloquy and cavernous rhonchus, over a space of three square inches on the lower part of the right lung, three months elapsed before these signs completely disappeared; and in another case, where a much smaller abscess existed in the top of the left lung, they did not entirely disappear until after six months; long before this, however, both these patients had recovered their flesh and strength, and considered themselves completely cured. In the few instances in which gangrene of the lungs has terminated favourably, similar symptoms have been observed; in fact, after the removal of the gangrenous portion, a cavity is left, which must be cicatrized precisely as that produced by an abscess.

Physical Signs of Pleuro-Pneumonia.—The extension of the inflammation of the lung to the pleura, (an event, as we have seen by the anatomical history, very common in pneumonia,) sometimes adds to the physical signs of the latter disease others of a novel character, which it is of importance to record. They depend exclusively on the presence of a liquid effusion, for as far as we have observed, we have been unable to recognise the affection of the pleura by physical signs, unless where this effusion has taken place. Some recent writers have indeed asserted that a creaking sound of friction is produced when the pleuræ are coated with freshly effused lymph, but this statement we have been unable to verify. The liquid effusion of a pleuro-pneumonia may declare its presence by producing of itself new physical signs, and by modifying those of the inflammation of the lung. Where the pleuritic effusion is not extensive, which is the common case, there may be so little liquid effusion that its presence can scarcely be detected, or it is discovered only by the greater deficiency of sound on percussion in the most dependent parts of the thorax, which parts regain a portion of their natural resonance when a change of posture raises them higher in relative position. Together with such a degree of effusion all the ordinary signs of pneumonia may present themselves without perceptible modification. But if the liquid effusion be greater, and sufficient to cover a considerable portion of the lung, it will disguise these signs, by rendering the crepitant rhonchus less distinct, while the sound on percussion is quite dull wherever the liquid reaches. If the pneumonia have attained the state of hepatization with bronchophony, and the point presenting this phenomenon be covered with liquid, the tone of the local resonance will become changed,—it will assume a cracked or bleating character, or rather a sound of this description will accompany the bronchophonic resonance. This combination of ægophony and bronchophony Laennec compared to the squeaking voice of punchinello; but besides the buzzing and squeaking combination of noises which this comparison represents, there is a tremulous or vibratory character in this morbid sound which seems alternately to approach and recede from the ear in sudden jerks. We have heard the voice otherwise modified by this combination of disease, as if it came through little cracked brazen trumpets; but, as far as we have observed, it is the undulatory or tremulous character which most constantly depends on the presence of the liquid, and is therefore the surest indication of the existence of a pleurisy. The most common seat of this phenomenon is the same as that of bronchophony, in the interscapular regions, but it may extend, especially when the effusion is abundant, through the whole of the ægophonic region, that is, in a band about three inches broad running from below the inferior margins of the scapula, in the direction of the ribs, to the sternum. It is most purely ægophonic in the anterior regions, there being commonly a noisy bronchophony behind. (See Pleurisy.) We have yet supposed the effusion only extensive enough to push aside slightly the lung from its apposition to the walls of the chest, and the sounds of pulmonary respiration are still heard pretty distinctly, modified by the inflammation, in the first stage into the crepitant rhonchus, and afterwards into the bronchial respiration and resonance; but there are some cases which we have described anatomically, and in which a copious pleuritic effusion has suddenly increased during a pneumonia, and has compressed and pushed aside the lung in such a manner that the sound of respiration can only be heard in the form of a crepitant rhonchus towards the root of the lungs, that is, in the scapulary, axillary, and infra-clavicular regions. This is the form of disease which produces the state before described anatomically under the name of *carnification*, and the pneumonia may in most of these cases rather be considered as secondary in existence as well as importance, and it is sometimes confined to a few lobules; but Dr. Stack inclines to the opinion that even in these instances the pneumonia is primary. (Dublin Hosp. Reports, vol. iv.) The pathological as well as the anatomical characters of pleuro-pneumonia lead to the belief that where one inflammation has greatly the predominance, the other is of trifling import, and that where both exist to a considerable extent, the complication, instead of presenting a more

aggravated case, rather mitigates the severity of both diseases, and this from a cause purely mechanical. The pressure exerted by the pleuritic effusion moderates the inflammatory action of the lung; and, again, the lung, in some degree consolidated by the inflammatory process, and not yielding to the encroaching effusion, sets limits to its accumulation. If, however, the intensity of a pneumonia is diminished by a coexistent pleurisy, its duration is probably prolonged; for the process of resolution is always much slower in this than in the simple case. This is because the interstitial effusion is more solid, and less mixed with the serous exhalation produced by common inflammation, and which cannot but assist in the discussion of the denser products. On the other hand, a pleurisy coinciding with a pneumonia will be of easier and speedier cure, inasmuch as the effusion is less abundant. The dry state of the carnified lung, taken together with the still constant production of the crepitant rhonchus in the course of the inflammation thus modified, affords an additional proof that this sign owes its existence to interstitial pressure *on*, rather than to any liquid effusion *within*, the air-cells.

Pathology of the general symptoms of Pneumonia.—Having made ourselves acquainted with the essential pathology of this disease, we may with advantage review the general symptoms in relation to it; we shall thus complete the circle of its history, and appreciate duly the value and importance of the various signs and symptoms.

In idiopathic pneumonia, arising directly from the application of an exciting cause, the inflammation commences before the febrile process begins; hence, during the period of general uneasiness, languor or depression, which are sometimes felt before an attack of pneumonia, the auscultator will generally discover a crepitant rhonchus in some part of the chest; sometimes there is a sense of fulness, soreness, or oppression about this part, or a stitch in the side; but these are often wanting until the supervention of fever, which first disguises, then develops the various general symptoms. At this time the pulse is commonly small, occasionally not altered in frequency, but generally accelerated. This is the latent stage of the inflammation, in which we cannot but point out its resemblance to the first effects of various mechanical injuries on a part of the body, which we have already shown to be produced according to a general law in the system. (See Irritation.) A cause has here been applied which has destroyed the balance of the circulation, and so affected the vessels of the lungs that their tonic power has suffered, and they become the seat of a congestive load of blood. This is the local injury, and first exerts its noxious or depressing influence on the system precisely as a crushed limb or a severe contusion would do, the local symptoms being more apparent in these latter instances because the animal sensibility of these parts is greater than that of the lungs. Hence the first symptoms of this, as well as of other inflammations, may be those of prostration or irregular reaction; and accordingly we find syncope, pallidity of the surface, vomiting, hiccup, &c., occasionally to precede the febrile stage of pneumonia. Rigor is, however, the more common symptom of commencing reaction, and it is the harbinger of that series of vascular movements which constitute the general and local character of phlegmasial pyrexia. After the rigor, which is accompanied by its usual smallness and frequency of the pulse, contracted coldness of the surface, and general depression of the powers, soon succeeds an increased action of the heart and arteries, indicated by a pulse of greater force and fulness, with more or less of the hard and sharp character of sthenic irritation; the surface becomes flushed and hot; and all the internal organs, the mucous surfaces, and secreting glands suffer from the febrile reaction in the interruption or perversion of their various offices. Under this influence the tendency of particular constitutions, or the morbid disposition of individual organs is discovered. In some the gastro-enteric mucous membrane especially feels the effect of this vascular excitement, and we have great thirst, scanty and high-coloured urine, tenderness of the epigastrium, irritability of the stomach, with a reddened tongue and fauces, and the various sympathetic signs of gastric fever. In another the fever assumes more of the bilious character, with bilious vomiting, turbid, saffron-coloured, and ammoniacal urine, and occasionally a jaundiced tinge of the skin. It is a rarer case for the head to suffer, but cases are not wanting in which great intolerance of light and sound, with delirium, have accompanied the symptomatic fever of pneumonia. In others, especially those of a plethoric habit, the fever is congestive; and besides the accumulation of blood in the focus of inflammation, there are other local determinations caused by the general vascular excitement; hence the head, the liver, the stomach, and the bowels may suffer, at once or singly, from the irritation extending its influence to a whole system of loaded vessels. It is during the development of this general reaction, which may thus vary in kind as well as in degree in different subjects, that the local symptoms declare themselves in the most prominent manner. Thus the same point of inflammatory congestion, with its crepitant rhonchus, which was perhaps the only local indication of disease, now increased and developed by reaction into active inflammation, becomes the cause of cough, pain, and dyspnœa in the various degrees that accompany the increasing period of pneumonia. It is not easy to define the cause of the variety in these symptoms which different cases exhibit;—why some patients should suffer scarcely any cough, while others are greatly harassed by it; why the breathing may in some be accelerated to a great degree without the patient being sensible of it, while others complain much of oppression when there is but a moderate encroachment on the function; and why some suffer acute and distressing pain, while others are scarcely conscious of any uneasiness. In a general way we must refer these differences to the state of the nervous system, the sensibility of which in these varying instances is sometimes exalted and sometimes depressed, either by individual peculiarity, or by some complication which the accompanying fever may produce. Thus, when there is a congested state of the vessels of the brain, sensibility is blunted, and the patient approaches the verge of suffocation without com-

plaining of either dyspnœa or pain. When, on the other hand, the inflammation is more concentrated within the chest, leaving comparatively free the sensorial functions, the exalted sensibility depending on inflammation is more easily felt, and this more especially when a part liable to tension, as the pleura, is involved in the disease. The urgency of the cough may also in a measure depend on the degree in which the bronchial lining membrane is inflamed; for if it is not affected, its sensibility will probably, through derivation, become lower than usual. Cough is occasioned by affections of the larger order of bronchial ramifications more powerfully than by those of the vesicular structure; and there is often, therefore, little of this symptom until the inflammation is extended to the lining of these tubes. From the absence also of the bronchial inflammation, there is often no expectoration at this early period; and cases occasionally present themselves in which it does not occur throughout the disease. The pathology of the secretion of the bronchial membrane, those viscid rusty sputa that so signally characterize peripneumony, is interesting. As in simple acute bronchitis this secretion becomes more tenacious in proportion to the intensity of the inflammation, so in this secondary bronchitis, when the vascular action of the membrane is augmented to its greatest degree, being as it were backed by the inflammation of the adjoining important and extensive vascular plexus, the secretion acquires still greater viscidity, and, in addition to this, becomes tinged by colouring matter from the mass of surrounding blood. When it is considered that this secretion proceeds from the immediate vicinity of the diseased part, it would appear that it must tend to relieve the inflamed vessels, and the inflammation, when very slight, may be terminated through this relief; but in the greater number of instances the relief thus afforded is too trifling to arrest the inflammation, and the viscid secretion, by still further obstructing the tubes and aggravating the dyspnœa, augments the danger of the disease, and this it does the more in proportion as its tenacity is greater.

The obstruction which the inflammation thus causes to the functions of pulmonary circulation and oxygenation of the blood now reacts in a new way on the circulating powers; the pulse, which at the commencement of the pyrexia had shown the heart to be vigorously contributing to the reaction, now falls in strength and hardness, whilst it commonly increases in frequency; and the stethoscope often discovers that there is a spasmodic briskness in the heart's contraction which seems to struggle vainly against the obstacle. Frequently this irritable contraction of the heart amounts to palpitation; and when we consider how its compartments must suffer from the injured balance of the circulation, this irregular action is readily explained. Owing to the obstruction in the lungs, the right side of the heart is unduly charged with blood, and subjected to the stimulus of over-distension; while the same obstruction prevents the left side from receiving its proper supply, and that blood which it does receive is but imperfectly arterialized. This pathological view, which is nothing more than a statement of observed phenomena, explains equally the violence and intensity of the inflammation in the pulmonary vessels, which are under the immediate influence of an over-stimulated right ventricle, and the weakness and failure of the general circulation, which depends for its support on the left ventricle. The depression thus occasioned by the failure of the general circulation, and by the imperfect oxygenation of the blood, is sometimes so great as to resemble typhous fever, whence such forms of the disease have obtained the name of *pneumonia typhodes*. Dr. Mackintosh has stated his opinion, in which we partly concur, that these varieties depend on the extent of the inflammation and obstruction to the pulmonary function, or on a complication with local congestions, and not on any thing specific in the pneumonia itself. The same writer thus expresses himself: "There is undoubtedly such a form of pneumonia, but I object to the adjunct *typhodes*, as expressing erroneous ideas of the pathological condition of the body. This form of pneumonia was very prevalent during the war, among troops stationed in exposed situations along the coast, and in large garrisons where the duty was severe. The soldiers were often seized with it when exposed at night as sentinels; instead of walking about, they frequently stand shivering in their sentry-boxes, the surface continues long chilled, and, with a view to fortify themselves and to produce warmth, they are in the habit of drinking ardent spirits in considerable quantity. In the strongest subjects I have seen the disease under such circumstances ran its course to a fatal termination in from forty-eight to sixty hours." (Elements of Pathology, &c.; 2d edit. vol. i. p. 420.) This sketch is well worthy of notice, as it illustrates the powerful effect in aggravating the disease, of two causes already noticed — long-continued cold and intoxicating liquors.

There is another complication of pneumonia which is very apt to give it an uncommonly depressed or typhoid type; this is, with severe bronchial affections, whether of the acute inflammatory character or of the asthenic kind, which goes under the name of peripneumonia notha. We have elsewhere described the peculiar prostration accompanying advanced states of these diseases, and have there referred this feature to the circulation of an imperfectly arterialized blood in the system, (see Bronchitis;) and we can readily conceive how serious such a complication must be in pneumonia. In persons advanced in life, and in frames debilitated by excesses or by a cachectic habit, the pneumonic inflammation is often accompanied by an early sinking of the powers; such individuals, after a few hours only of pain, cough, or acute symptoms, become lethargic or insensible, with a weak intermitting thready pulse, pallid skin, partial sweats, cold extremities, and, after lying in that state for some days, sink often without any of the prominent general symptoms of diseases of the lungs. This is a latent form of pneumonia which is far from uncommon; and although after death a large portion of the lung may be found in the second or third stages, none but a very attentive examination could have detected from the general symptoms the real situation of the fatal disease. Auscultation would have indeed furnished a much readier means of

discovering such an extensive organic lesion; but we have known cases to have deceived practitioners, competent and versed in the use of this method of exploration, from the circumstance that their attention had not been drawn to the thoracic viscera, all prominent symptoms having ceased before they had an opportunity of seeing the patient. In these and other latent forms of peripneumony, to which we shall presently revert, although no obvious dyspnœa be present, the frequency of the respirations may be detected on a close inspection, and the hand placed on the chest will often perceive the vibration of a liquid gurgling in the bronchi; these circumstances may lead to a suspicion of the existence of the disease, but it can be recognised with certainty only by auscultation and percussion: it is unnecessary here to detail this class of signs, as their distinctive characters will again come before us under the head of *diagnosis*.

[Typhoid pneumonia is exceedingly common in the eleemosynary institutions of many parts of the United States; and is often an intercurrent affection. It is apt to be mistaken or overlooked unless the physician is well aware of the physical as well as of the general signs.]

In its simpler forms, when the disease is extensive and has reached the second and third stages, the whole symptoms commonly show an abatement of the pain, fever, and other indications of exalted organic and animal sensibility, whilst there is an increasing injury and embarrassment of the function of the affected organ. The orgasm of the inflammation has in a measure expended itself in the effusion, and the general pyrexia sinks under the depressing influences of an injured function, with which the whole frame sympathises. This change in the character of the symptoms is of the highest practical importance, as it is a signal to modify the treatment in a material degree. The discontinuance of the more intense degree of inflammatory action is moreover evinced by the expectoration, which, losing its extreme viscidity and sanguinolent tinge, now bears more the character of a serous exhalation, or of a disordered mucous profluvium. The purulent and albuminous matter and bloody streaks that are sometimes seen in the advanced stages of pneumonia, are rather to be ascribed to the accompanying bronchitis than to the breaking down of the tissue of the lung: when the latter does happen, in the much rarer cases of abscess or gangrene, the expectoration is commonly very copious, that from an abscess being distinctly puriform, whilst that from gangrene contains pus, or mucus with a dirty brownish or greenish sanies, occasionally with portions of sloughy tissue, all characterized by an intolerable putrid fetor. The suppression of the expectoration which commonly occurs in fatal cases arises usually from the failure of the respiratory forces to effect its expulsion, and not from a cessation of the secretion. Hence by auscultation we hear a mucous or bubbling rhonchus, which goes on increasing and extending to the larger bronchial tubes, until it becomes tracheal, when it is audible to the by-standers, and constitutes the *death-rattle*, long known as a harbinger of death. Expectoration, as we have elsewhere shown, (see Expectoration,) so far depends on a free exercise of the organs of respiration, that unless air is carried beyond the accumulated matter, the expulsion of this matter can scarcely be effected. The short gasping breath drawn when a large portion of the pulmonary tissue is hepatized cannot accomplish this: the cough, when present, can scarcely reach the obstructing matter, and not unfrequently the sympathetic sensibilities and muscular powers on which this forcible respiratory act depends, are so much reduced that it ceases altogether.

In reviewing the symptoms of a favourable termination of pneumonia, the first class of phenomena which claim our attention are the critical evacuations. These, together with the preference which they show for particular days, are among the obscure laws which govern the human frame, and which must be the subject of far more extended observation before we can hope to explain them by reference to any of the simpler vital or physical influences. When Broussais ascribes critical evacuations to a predominance of a secondary irritation in a secreting organ over the primary, he only substitutes a new and unsatisfactory form of words for a simple declaration of the fact; for the salutary effect of the evacuation is much more explicable than the cause which determines its presence and its kind. Besides, the word irritation seems not a very appropriate one to apply to the influence which changes the skin from hot, harsh, and dry, to soft and perspiring, the urine from scanty, high-coloured, and scalding, to copious and less acrid, and the expectoration from very viscid and sanguinolent to an abundant, simple, and more liquid mucus. For the present we would prefer viewing critical evacuations rather as signs than as causes of improvement; for although in a free expectoration or a hemorrhage we can at once perceive a rational mode of relief, yet the cases of perspiration, diarrhœa, or a lateritious deposit in the urine, may with equal reason be viewed as a *consequence* of the diminution of the disease, which restores to the skin, the bowels, or the kidneys, such functional powers as enable them to carry off from the system matters accumulated during a period when the powers were more or less paralyzed or perverted by the general febrile derangement; and the fact that such evacuations do sometimes take place without proving critical is another reason for leaning to this view. The subject involves more conjecture than would be consistent with the design of a practical work, and we therefore abstain from entertaining it further than to remark, that no close observer of nature can refrain from the conclusion that, in one way or another, primarily or secondarily, a disordered state of the fluids forms an important link in all extensive febrile and inflammatory diseases.

The tendency to evening exacerbation in this and in other diseases is another phenomenon more observed than explained. We remember to have heard M. Andral cite in his lectures the personal experiments of a physician, which illustrated forcibly the effect of periodic habit on the body: for several nights in succession during the winter, at a particular hour, he plunged into a river, returning immediately to his bed. On intermitting the practice on certain days, a shivering

fit came on at the customary plunging hour, and was followed by the usual reaction, as if the plunge had not been omitted. Perhaps the evening exacerbations of this and other inflammatory and febrile diseases may be partly referred to the same law of habit, of which this is merely a prominent illustration. The addition of nutrient matter to the blood, together with the accumulated excitements of the day, produce a tendency to a febrile movement in the evening, and these causes are so regularly applied that their effect becomes a habit, and persists even when they are removed. With a few, the morning is the time of exacerbation, and with such persons this may be determined by a slight habitual disturbance, which is common at that period in dyspeptic individuals.

The rapid general improvement which commonly attends the progress of recoveries from pneumonia indicates rather the restoration of the healthy balance of functions than the entire removal of all local disease; for some dyspnœa and quickness of pulse often remain up to an advanced period of convalescence, and by means of auscultation we discover a cause in the still diseased state of portions of the pulmonary tissue. A bronchial respiration, a resonance of the voice, or a crepitant rhonchus, with some dulness on percussion, remains as a proof that the effects of inflammation are still present, and, amidst other signs of apparent recovery, these require time and care to secure their restoration. Sometimes, as we have seen anatomically, points of hepatization remain for a considerable time, and may become a focus for the rekindling of the acute disease by any error of diet or regimen; or, if left unsubdued, the inflammation may continue there in a chronic form. It is a commoner case that a crepitating or rather subcrepitant rhonchus persists; this, if there is no lingering fever or considerable cough, and if the expectoration has lost its red or yellow tinge and viscidity, is to be considered as the effect of œdema rather than of inflammation of the tissue, and is removed most effectually by a mild tonic combined with expectorants and diuretics.

Pathological Varieties and Complications of Pneumonia.—We have already noticed the complication of pneumonia with bronchitis, and the effect that it commonly has of increasing the depression attendant on the disease, and thereby disguising its inflammatory nature. Drs. Graves and Stokes (Dublin Hosp. Rep. vol. v.) have judiciously remarked that in the treatment of this combination the first remedies and a single bleeding produce such relief to the bronchitis, that a practitioner may be led to suppose that the whole disease is overcome; whereas auscultation discovers, by a remaining crepitant rhonchus, that the most formidable affection still remains to be subdued. There are, however, a few instances in which this combination puzzles even the auscultator. The pneumatic crepitation is sometimes so masked by a loud and general mucous rhonchus that even an attentive examination may fail to detect it: this happens especially when the pneumonia is central and towards the root of the lungs, and does not extend to the surface. Laennec indeed asserts that a deep-seated crepitant rhonchus can always be distinguished, by those practised in the stethoscope, from any mixture of sounds produced nearer to the surface; but we now think that to insist, as we once did, on the possibility of this distinction, would be to reckon too much on the infallibility of auscultation. The presence of a rusty tinge in portions of the expectoration will more frequently declare a latent peripneumony; and in the progress of the disease the extension of the inflammation to the surface will make it more easy of recognition. Pneumonia may arise in the course of either acute or chronic bronchitis, and such an event is of great importance in both cases. Acute bronchitis is most liable to pass into peripneumony in young subjects; and the habitual chronic catarrh of old people sometimes takes a similar course. Andral remarks that this accident is not an unfrequent cause of the kindling up of fever and increase of dyspnœa in aged asthmatic subjects; and these symptoms may erroneously be ascribed to an aggravation of the habitual senile disease; this increases the danger of the complication, and for causes that we have just explained, the diagnosis must often rest on uncertain general symptoms.

There are two modifications of bronchial inflammation which occasionally exhibit a strong tendency to pass into pneumonia, pertussis and the influenza or epidemic catarrh. The violent fits of coughing frequently coexisting in these complaints with considerable fever, appear to us to have a great share in extending the inflammation to the great pulmonary plexus of vessels. These paroxysms of cough determine a great degree of congestion in the lung, and we have already seen how easily such a congestion may become inflammation. Of such a termination of hooping-cough we have witnessed numerous instances, proved in some by anatomical inspection, and in many by the addition of a crepitant rhonchus to the physical signs of pertussis. In many of the latter cases the fever had been so gradually increased, and the general peripneumonic symptoms had been so mixed up with those of the aggravated pertussis, that but for auscultation the more serious disease might have escaped detection. This complication is most common in very young and delicate children, and during winter and spring, the usual peripneumonic season. Of the supervention of pneumonia on influenza we have seen several instances during the epidemic that has lately prevailed to so great an extent, and from the effects of which the country is still suffering (May, 1833). It was at the time of its greatest prevalence, when the weather was cold and changeable, that the disease in occasional examples put on this decidedly inflammatory type. In two instances we resorted to free bloodletting with immediate relief; and it is worthy of remark, that the patients suffered less from weakness than many others where no depletory measures were adopted.

[In children especially, in whom no information from the sputa is attainable, bronchitis often masks pneumonia. In them, too, the sounds afforded on percussion may be alike on both sides, as the affection is rarely confined to one lung. Previous to six years of age, the symptoms and progress of the disease differ somewhat from those of a later period. It would seem, according to Messrs. Gerhard, Rufz, and Rilliet and Barthez, to occu-

then as a secondary lesion; and it has been conceived to be owing to a stagnation of blood in the lungs, which acts as a foreign body as it were, and concurs in producing an alteration in the pulmonary tissue with which it combines, and becomes identified, so as to form hepatization of the lungs. Although, however, in very many children, the disease is generally secondary, in other cases it attacks those in perfect health, and runs its course in a brief space of time,—occasionally in forty-eight hours. Howsoever this may be, it is certain, that in younger children, the diagnosis between pneumonia and bronchitis is not easy.]

We have before described the combination of pleurisy with pneumonia. Next to bronchitis, it may be said to be the most natural concomitant of the parenchymatous inflammation, for its contiguity exposes it to be involved in an extension of the disease. As we have said before, it may considerably modify its course, but instead of, as bronchitis, disguising the seat of the complaint, it often declares it more openly by adding the prominent symptoms of pain or stitch in the side, and a catch in the breathing. These obvious symptoms are not, however, the constant concomitants of pleuro-pneumonia; and cases sometimes present themselves in which this and every other variety of the disease require the fullest investigation of both physical and general signs to ascertain their nature with precision. As far as we have observed, a pleurisy supervening on pneumonia aggravates the case most when it is attended with a sharp pain and catch in the breathing; for it then keeps the patient in a distressing struggle between pain and suffocation, and unless the pain yield soon, it may in this way prove fatal. Generally it soon subsides, the active orgasm being derived to the pulmonary tissue, which on account of its greater vascularity is more obnoxious than the pleura to the inflammation. For this reason it is not common for the pleurisy to gain on the pneumonia, and it is usually limited to the points where the latter reaches the surface.

[It is maintained by some pathologists, as by M. Valleix and Dr. Gerhard, (*Lectures on the Diseases of the Chest*, p. 88, Philad. 1842,) that inflammation of the pleura rarely complicates the pneumonia of children. By others, however, the complication has been found to be common, the pleura being unaffected in the observations of MM. Rilliet and Barthez, (*Op. cit.*) in ten cases only. Evidences of acute pleurisy existed in one third of the children from two to five years of age.]

Peripneumony frequently attacks phthisical subjects in both the early and the advanced stages of tubercular disease. Miliary tubercles in the lungs may be viewed as causes both predisposing and exciting; they render persons more liable to inflammation on exposure to cold or any other exciting cause; and during a febrile state of the system, their presence and mechanical irritation may localise in this organ a general inflammatory diathesis. In several instances of subjects who have died of continued fever with pneumonia, we have seen numerous tubercles in the inflamed lung, and similar cases are recorded by Andral and others. The liability of phthisical subjects to intercurrent peripneumony has been noticed by Laennec, Louis, and Andral. It is not generally severe, and is often spontaneously cured; which illustrates a remark which we have before made, that pneumonia excited by a local cause is never so severe as that which arises from an extensive impression on the circulation. Nevertheless, the similarity of its symptoms to those of the phthisical disease often screens it from notice, with the effect that its treatment is neglected, and if it does not at present endanger life, it accelerates the progress of the other fatal disorder. Hence, as Laennec recommends, it is important to examine from time to time the chests of consumptive patients, particularly when there is any sudden feverish attack or decrease of the strength. Andral asserts that intercurrent peripneumony, from being overlooked, frequently occasions the death of phthisical subjects.

We have had occasion to speak of the occurrence of pneumonia in the course of various febrile disorders, and it is the more important, as the inflammation here commonly takes a latent form. This is especially the case in severe small-pox and erysipelas, and in fevers of the congestive kind. In a considerable proportion of the fatal cases of these diseases, this inflammation seems to be the cause of death. During the prevalence of a peripneumonic epidemic, and in the winter season, Laennec remarks that in patients suffering under these disorders, any marked increase of fever in the young and robust, and any sudden prostration of strength and loss of consciousness in the aged and debilitated, are generally the result of a pneumonia supervening, and it is frequently accompanied with neither dyspnœa, cough, expectoration, nor any of its usual symptoms. The frequent occurrence of a latent pneumonia in continued fever is a fact too well known to morbid anatomists; it has already been noticed in the article Fever continued. A harsh state of the skin, fetid excretions, and sordes on the teeth and tongue coming on in subjects worn out by cancer or other severe chronic diseases, according to Laennec, frequently indicate pneumonia, which soon ends with coma, tracheal rattle, and death. The bronchial affection of measles sometimes passes into pneumonia, especially if the eruption is repressed or disappears suddenly; but in this case the symptoms are commonly urgent and sufficiently characteristic. Endemic fevers sometimes determine an inflammation of the lungs, which is frequently latent. Broussais records this of the intermittent fevers which attacked the military in the hospitals of Bruges. (Hist. des Phlegmasies Chron. t. i.) The same has been remarked of malaria fevers of other kinds, and of the pestilential cholera. The latter disease sometimes shows a remarkable tendency to pneumonia in the stage of reaction, and this event seems to be favoured by the great congestion which occurs in the pulmonary vessels during the period of collapse. The reaction of intermittent febrile diseases has been sometimes observed to be so regularly accompanied by pneumonic symptoms that some authors have given the name of intermittent peripneumony to these affections. Thus Broussais has noticed the quotidian returns of inflammation both of the lungs and of the

pleura at the time of the febrile paroxysm. But it must be remarked that in these cases either the pulmonary affection must have been exceedingly slight, or it must have continued during the apyrectic period, and merely have been more fully developed by the excitement of the paroxysm.

Pneumonia is sometimes produced in gouty and rheumatic subjects, and this may occur either vicariously, so that the limbs are relieved, or conjointly with the affections of these. In the first case, the pulmonary affection is generally apparent; in the latter, it is sometimes latent. P. Frank has remarked that in rheumatic subjects pneumonia sometimes terminates without any expectoration, with a copious discharge of clear urine, amounting to twelve pounds and upwards. This curious fact is another sign of the connection which subsists between rheumatic and gouty affections, and a diseased state of the fluids of the body.

Hypertrophy of the heart modifies the pulse in pneumonia in a manner that deserves notice. Instead of falling in strength as it generally does, and becoming small and frequent, from the causes that we have before explained, the pulse in some degree retains the hard vibrating character peculiar to hypertrophy. This is the case, however, only when the left ventricle is affected. Hypertrophy of the left ventricle predisposes to pneumonia, and generally aggravates its form. In pneumonia complicated with any disease of the heart, the pulse becomes more fallacious than ever; and neither its frequency nor its strength bears any relation to the extent of the inflammation.

Inflammation of the mucous membrane of the stomach and bowels is by no means an uncommon accompaniment of pneumonia. It generally gives a more adynamic type to the disease, and manifests itself by the peculiar state of the tongue, which is at first very red, and afterwards parched and brown, with great thirst, vitiated excretions, and frequently tenderness at the epigastrium. Various other diseases may combine themselves with pneumonia, and although they may manifest themselves by their peculiar groups of symptoms, yet the complication generally increases the obscurity of the case, and the difficulty of its treatment.

[In children, from the age of two to sixteen, there would appear to be six diseases in the course of which pneumonia is apt to occur in very large proportion. Thus, according to M. Grisolle, (*Op. cit.*) secondary pneumonia occurs in seven-eighths of all cases of cramp; in five-sixths of all cases of cancrum oris; in one-third of all cases of enteritis, measles, and hooping-cough; and in one-fourth of all cases of small-pox. According to the same observer, intercurrent pneumonia was seen in one-seventh of all cases of continued fever; one-sixth of all cases of acute affection of the brain; one-fourth of cases of pulmonary tubercles; one-fourth of cases of disease of the heart; and in about one-sixth or one-seventh of all cases of cancerous disease of the viscera; organic diseases of the liver—especially cirrhosis, Brights' disease, &c. It is likewise a frequent complication of glanders, phlebitis, &c.]

Several surgical writers have noticed the occurrence of pneumonia after amputation and other great surgical operations, and likewise after extensive wounds; and it has been supposed that this disease is frequently the cause of death in these cases. This is a very interesting subject, and one that requires further investigation. The disease of the lungs in these instances appears to be quite of the latent kind, and sometimes it only declares itself by the dyspnœa and rattle a short time before death. We cannot speak from personal observation on this subject; but from the description given, it would seem that these cases of pneumonia may be ranged in two classes: those which partake of the character of the pneumonia of the moribund, which has often been alluded to in this article, and which seems to be a concomitant rather than a cause of the changes of death; and those which supervene during a febrile reaction, and are disguised by other local and general symptoms. The latter class occurs most commonly in the subjects of amputation, or where a great change has been wrought in some part of the circulation, leaving the heart vigorous and disposed to sthenic reaction. The former comprises cases of bad wounds or unfavourable operations, where the powers fail under the local injury, and as a part of this failure, a congestion takes place in the lungs, which is, by a partial reaction, converted into inflammation.

[From a table of forty-one deaths, following various injuries and diseases, in the surgical wards of University Hospital, London, — in which an account of the state of the lungs was kept,—these viscera, according to Mr. Erichsen, (*London Medical Gazette*, Feb. 1841,) were found in twenty-three cases to be in the first or second stages of pneumonia. On this account it has been suggested to defer operations, when practicable, during the prevalence of an epidemic pneumonia.]

It will be perceived that, in describing these various complications, we have comprehended nearly all the varieties of pneumonia which have been described by authors; and we apprehend that the pathological views of these varieties with which modern researches have so fully furnished us, so clearly expose the real nature of the greater number, that it is unnecessary to consider them further in a separate form. The false or bastard peripneumony, (*peripneumonia notha* of Sydenham,) does not require notice here, for it has been already described under its proper head, Bronchitis. The bilious peripneumonies described by Stoll and other writers of his time, do not appear to constitute a real pathological variety of the disease: for they were either cases of bronchitis in which the sputa were tinged with bile from a simultaneous affection of the liver; or, what is more probable, they were ordinary cases of pneumonia attended with the characteristic expectoration, which is often yellow or greenish, from the admixture of various proportions of the colouring matter of the blood, and which these writers hypothetically ascribed to an intermixture of bile. Laennec says that he has frequently met with these greenish sputa where there existed no bilious complication: he admits that he has sometimes seen them disappear after bilious evacuations; but

this circumstance can be viewed in no other light than that these evacuations were critical, and coincided with a resolution of the inflammation.

Diagnosis of Pneumonia. — We have devoted so much space to the consideration of the signs of this disease, that we have now only to recall the most characteristic, and compare with them the distinctive signs of a few other maladies with which they may be confounded.

The manner of attack, the dyspnœa, the pulse, the pain, the cough, and the side of the decubitus, although in the manner in which we have described them, they contribute to form the general character of the disease, yet are quite incompetent to distinguish it with certainty from other acute inflammations of the chest, particularly bronchitis and pleurisy. Still these symptoms are not to be disregarded, for, taken in conjunction with the physical signs, they often assist us much in the diagnosis. Of all the diagnostic signs of pneumonia, the characteristic form of the expectoration is the most infallible; and when it does occur, there can be no doubt of the existence of parenchymatous inflammation; but it is sometimes entirely absent; frequently it does not appear until after the disease has existed for two or three days, and it generally ceases as the inflammation reaches the second and third stages. It may moreover pass by such insensible gradations into the colourless form of bronchitic sputa, so that it is not always easy to determine whether it partakes of the pneumonic character or not. The crepitant rhonchus, when it occurs distinctly or unmixed, and in conjunction with the general signs of pneumonia, may be considered as quite pathognomonic; and as its presence is much more constant than that of the expectoration, it may be considered as the more available diagnostic sign. Laennec considered it the most important of all physical signs, "inasmuch as it is invariably present, and from the very invasion of the disease; and exists in no other case, except in œdema of the lungs and pulmonary apoplexy, two diseases which are easily distinguished from this by their own peculiar signs and symptoms. M. Andral is mistaken in saying that the crepitous rattle sometimes exists in acute bronchitis, (Clin. Méd. tom. 2. p. 333,) and I think this is evident from his own cases. From its constant presence in this disease, I regard it as the most practically useful of all the stethoscopic signs, inasmuch as it points out, in its very earliest stage, one of the most severe and most common diseases, and thereby enables the physician to apply his means with much more chance of success than he could have done even a few hours later." (Dr. Forbes's Transl. p. 213.) M. Piorry has lately questioned the pathognomonic relation of the crepitant rhonchus to pneumonia, not from observation of disease, but from the circumstance that a crepitation like it may be produced on applying the stethoscope to a lung out of the body. (Gazette des Hôpitaux, t. 6. No. 116.) Such an hypothetical objection cannot, however, be entertained, in opposition to the mass of evidence in corroboration of Laennec's opinion, and we have already explained how the artificial crepitation in question is produced. (See page 606.)

The preceding characters will be quite sufficient to distinguish recent pneumonia from pleurisy. In the latter the sound of respiration is unaccompanied with a rhonchus, and is only rendered weaker, first by the pain restraining the respiratory movements, and afterwards by the liquid effusion pushing aside the lung. There is sometimes dulness on percussion in the early stages of both diseases; but in pneumonia this dulness will be found to be fixed in the spot where the crepitant rhonchus is heard; in pleurisy, on the other hand, it generally occupies the most dependent part, and changes with a change of posture. This last criterion, which is very easily applied, is sufficient to discover moderate pleuritic effusions in every case except in that of the effusion being limited by adhesions of the lung to the ribs. This ægophonic resonance of the voice, when perfect, is another sign equally distinctive of pleurisy; but as for its production there must be only a certain thickness of the layer of fluid, its presence is often of short duration, and it may thus escape detection. The diagnosis between these diseases is much more difficult in their advanced stages, particularly when they are extensive. Thus it may happen that we are called to see a patient who has been ill for a considerable number of days, and who has had more or fewer of the equivocal general symptoms which are applicable to either pleurisy or pneumonia; by auscultation we find no sound of respiration in one side of the chest, which is also quite dull on percussion. The question then presents itself—is the case one of pneumonia, with the whole lung in a state of hepatization, or is it a case of pleurisy, acute or chronic, with a very extensive effusion? These difficulties have been sagaciously pointed out by Dr. Stack, (Dublin Hosp. Rep. vol. iv.) and we admit them to be sufficient to mislead any but a very careful observer. But an attentive consideration of the previous history, and a minute examination of the physical and some general signs, will, we believe, always furnish us with a correct diagnosis. We have in two instances been mistaken, but we refer our error rather to the insufficiency of our examination than to an absence of diagnostic signs; and these cases, which occurred in dispensary practice, presented a rare combination of deceptive circumstances. The most obvious distinction between a hepatized lung and copious pleuritic effusion is the constant occurrence, in the former case, of a loud and almost pectoriloquous bronchophony under the scapula, along the spine, and below the clavicle, and the general absence of this sign in the latter. This test would have been sufficient to distinguish the case cited by Dr. Stack as one of peculiar difficulty; the absence of this resonance clearly proving it to be pleurisy and not pneumonia. The *presence* of this bronchophony is not, however, an equally sure proof that the lung is hepatized. In one of the instances before alluded to, with a perfect deadness of sound on percussion over the whole of the right side of the chest, a bronchophony and bronchial respiration were heard between the scapula and spine and below the clavicle on this side, from which we too hastily concluded the disease to be pneumonia; on dissection it proved to be pleurisy, the right thorax being full of serum and lined with a dense

false membrane; the lung was compressed by the effusion into a mass which adhered by solid pillars to the upper part of the cavity under the clavicle and to the posterior part exactly in the points where the bronchophony had been heard. These adhesions were obviously the cause of the sign which misled us; and as the possibility of their occurrence in other cases must detract from the certainty of its indications, we must seek for further means of distinction. In copious pleuritic effusion there are commonly several signs of displacement, which are absent in hepatization of the lung. Thus the affected side is commonly enlarged, as can be ascertained both by inspection and admeasurement. By viewing or feeling both sides of the chest at the same time, if there is no obvious enlargement, it may be perceived that the affected side does not partake, equally with the sound side, of the respiratory movements; it remains stationary in a fixed state of distension, and this in a more remarkable degree than occurs with a hepatized lung. The intercostal spaces are also more prominent on the affected side, which gives it a more rounded appearance; this character readily distinguishes pleuritic effusions from hepatization in thin subjects, but it fails where the integuments are fat or œdematous. Dr. Stokes has pointed out some other means of distinction, founded on the same circumstance of displacement, which occurs exclusively in pleurisy. (Dublin Med. Journal, March, 1833.) If the disease occupy the left side, a copious pleuritic effusion will generally displace the heart, which will be heard and felt pulsating, not in its usual place, but to the right of the sternum; in pneumonia the pulsations are not displaced, but they are uncommonly audible throughout the affected side. If the disease be on the right side, an effusion will push down the liver, and make it perceptible below the false ribs; it will also press aside the sternal mediastinum, so that the whole sternum would sound dull on percussion; in hepatization of the whole right lung there is neither displacement of the liver nor of the mediastinum; and as the resonance of the sternum on percussion depends on portions of both lungs beneath, its right half would yield a dull and the left a clear sound. By some or other of these distinctive marks we may venture to assert that a pretty certain diagnosis between pneumonia and pleurisy may always be obtained. For further particulars on this point we refer to the articles Pleurisy and Empyema. The distinction of slight degrees of pleurisy accompanying pneumonic inflammation will depend on the circumstances that change of posture modifies the sound on percussion, rendering the dependent parts the least sonorous, and that the bronchophony is rendered bleating or vibratory whenever a thin stratum of liquid is interposed between the pleuræ. Pleurisies circumscribed by adhesions are scarcely to be recognised unless when sufficiently extensive to cause a fulness of the intercostal spaces. But as we have before remarked, the pleurisies supervening on pneumonia generally are of secondary importance, and their detection is not an object of great interest.

Bronchitis in its severer forms is frequently confounded with pneumonia; it is often by the physical signs only that they can be distinguished with certainty; and even these sometimes fail to detect a latent pneumonia in combination with bronchitis. In pure bronchitis no crepitant rhonchus occurs, but there may be a variety of mucous, sibilant and sonorous rhonchi. The distinction of these from the pure crepitation of peripneumony is sufficiently obvious, but it is not so easy to distinguish this crepitation when it is mixed up with the other rhonchi. In these difficult cases we must look more to the expectoration, progress of the symptoms, and state of the countenance. With respect to the latter indication, as a diagnostic mean in bronchitis, pleurisy, and pneumonia, we have received some valuable hints from Dr. Stack, (Dublin Hosp. Rep. vol. iv. p. 90, et seq.) although we can scarcely accede to his opinion that it is generally more sure than the physical signs. In pleurisy, either the face is flushed, and the lips are florid, or their appearance is not changed from that of health. In humid or severe bronchitis, the parts of the face usually coloured and the lips are more or less blue or livid, according to the extent of the bronchial membrane affected, and the quantity of secretion in them, which prevents the oxygenation of the blood. The flush of pneumonia is different from either, being an intermediate shade of purplish red. There is no correspondence between the flush often observed in one cheek and the side affected, and the flush often shifts from side to side. In pleurisy and bronchitis, the colour in the lips and cheeks is commonly circumscribed, the other parts being uncommonly pale; but in pneumonia the redness, when present, is more suffused over the whole countenance. These variations of colour, which seem to depend on the degree in which the functions of arterialization and circulation of the blood are respectively affected, may assist us in doubtful cases in forming a diagnosis, but we have seen them fail too often to place implicit reliance on them. In the advanced stages of pneumonia, bronchial resonance and respiration and the perfect dulness on percussion sufficiently distinguish it from bronchitis, in which the mucous rhonchus and a considerable clearness of sound on percussion persist until the last. Dr. Stack, indeed, cites a case of humid bronchitis, in which, a few hours before death, the chest yielded no resonance; but no such example has been elsewhere described, and the anomaly must be attributed to the moribund state of the patient, and the imperfect entrance of air into the lungs at that period.

The physical signs of extensive pulmonary apoplexy sometimes approach closely to those of peripneumony, there being in the spot affected a dulness of sound on percussion and absence of the respiratory murmur, surrounded by a crepitant rhonchus. The absence of fever, however, and the presence of hemoptysis will generally be sufficient to characterize the former disease; and, by referring to its history, it may be perceived that there is commonly much difference in the origin and progress of the two complaints. An inflammation of the tissue of the lung is sometimes engrafted on apoplexy of the organ, and it will then be more difficult to distinguish; but the access of feverish heat, the increase of the crept

tant rhonchus, and the viscidity of some portion of the sputa, will generally give evidence of the complication.

Combinations of several affections of the chest will sometimes, more closely than simple diseases, simulate pneumonia. Œdema of the lungs combined with pleurisy or even pleurodyne, may produce physical signs resembling the first stage of peripneumony, and a similarity in many of the general symptoms increases the difficulty of the diagnosis: the different character of the expectoration, and the history and progress of the case, are the means of distinction most to be relied on, and an attentive examination of these will seldom fail to lead to a correct decision. It is sometimes more difficult to distinguish between chronic induration of the lung, whether from chronic peripneumony, agglomerated tubercles, or melanose formations, and the hepatization of local acute inflammation supervening on phthisical disease. If the case has been watched, the attack of the latter affection must have been marked by some augmentation of the fever and dyspnœa, and the physical signs of the first stage would have further characterized it; but if the hepatization is complete before the first time of examination, we must remain for a time in doubt. These local hepatizations are sometimes formed and reabsorbed without much aid from treatment, and it is therefore less important to distinguish them than the inflammatory stage which precedes them, and which is, as we have just observed, cognizable by its peculiar signs.

In fine, we would recommend the student to found his diagnosis as much as possible on a knowledge of the true characters of disease, rather than to any detailed distinctions which can be comprised in a treatise. The varieties and complications of diseases are too numerous to be capable of adaptation to any fixed rules of diagnosis; but when the mind of the observer is fully imbued with the principles of a true pathology, his judgment will find in any combination of phenomena some means of distinction less fallible than the memory can ever furnish from the most minute exposition of possible cases.

Prognosis.—The remark which we have just made on the subject of diagnosis may with nearly equal force be applied to the prognosis, or estimate of the severity and probable issue of the disease. Our study of the pathology will lead us to form a correct opinion more surely than any enumeration of good or bad signs. The prognosis of this disease is always serious, and even in favourable cases must be spoken of with caution, for cases, which are slight at first, sometimes take an unfavourable turn; and in progress towards recovery, as long as the disease lasts, there is a chance of a relapse, which may throw the patient into new and peculiar danger. The circumstances of the pathology of a case which affect the prognosis, are the degree of the inflammation, its extent, its seat, its complication with other affections, and the condition of the various functions of the body.

[The average duration of pneumonia is from twelve to twenty-four days. At times it continues only two or three days; at others, it may go on for thirty or forty. Of 78 cases observed at the Hospital La Charité, Paris, between the years 1821 and 1827, twenty-eight, according to M. Louis, proved fatal.]

As is the case with other inflammations of important organs, the continuance of the disease increases its mischief and danger as it injures the organization of the part; hence the prognosis is more serious if hepatization has taken place, and still more so if the signs seem to indicate the supervention of the third stage. The duration of these stages varies very considerably according to the effect of the treatment and the age of the subject. Laennec states the average proportion to be as follows: "The obstruction, or first stage, usually lasts from twelve hours to three days before passing to the state of complete hepatization: this lasts from one to three days before spots of purulent infiltration make their appearance; and the period of suppuration (from the time when the concrete purulent infiltration is distinctly perceptible until this is completely softened into a viscid fluid) varies from two to six days. Bloodletting, derivatives, and resolvents or stimulants of the absorbent system, obviously retard the progress of the disease, and consequently prolong the period of the first two stages. Convalescence is rapid in proportion as the inflammation is of small extent and has been early checked." (Op. cit. p. 211.)

We have already had occasion to remark that in children the inflammation continues for a much longer period in the first stage; after some weeks' duration, presenting only some hepatized points at the margin of the lung or in isolated lobules. Laennec has observed the same peculiarity in certain epidemics, as in the *grippe* of 1803, when he noticed the first stage to continue for seven or eight days, sometimes affecting the whole of one lung, and part of the other, and proving fatal before any distinct hepatization occurred. We have before mentioned, on the other hand, the remarkable tendency of the inflammation in old and debilitated subjects to pass rapidly to the state of purulent infiltration; the author just named describes this to take place sometimes within thirty-six or even twenty-four hours. Recovery is sometimes affected by resolution and reabsorption from every degree of pneumonia, but the chances of this favourable termination are very small when the signs of hepatization have continued for such a length of time that purulent infiltration has probably occurred. Even simple hepatization requires time and favourable circumstances for its removal; for besides that the deposited matter obstructs the due function of the part, and thereby prevents the restoration of the balance of health, it likewise remains as an irritating cause, giving a proclivity to the recurrence or continuance of inflammatory action. Unless, therefore, the tendency to this be kept in a state of subjection, and the process of absorption be perceptibly gaining ground, the prognosis must continue to be doubtful. The supervention of gangrene will always increase greatly the danger of a case. If the gangrene is extensive, it must inevitably prove fatal; and where small and circumscribed, if the powers of the system are weak, they can scarcely be sufficient to support life until the noxious dead matter is thrown off; if, however, the pulse and muscular system show still considerable strength,

this process may be happily effected, and there are recorded instances of recovery even from the gangrenous termination of pulmonary inflammation. An interesting case of this kind recently fell under the observation of the writer in conjunction with Dr. Chambers and Mr. Jay of Sloane-street, and was watched with great interest during a doubtful period of several days; the inflammation in the second state affected the right lung, and signs of excavation (concluded to be gangrenous from the odour of the expectoration) were heard at the inferior angle of the scapula; the case was greatly aggravated by the sudden supervention of a pleurisy on the left side, excited probably by the irritation of gangrenous matter in the circulation. This new attack, and the depletions necessary to subdue it, greatly increased the danger; but the powers of life ultimately prevailed; the expectoration became less fetid, more purulent and abundant, and after some time gradually ceased under the influence of a mineral acid; the cavity progressively diminished was at length cicatrized, and the patient, in three weeks from his worst state, was quite convalescent.

The extent of the inflammation, as may be anticipated, greatly affects the danger of a case. A double pneumonia affecting both lungs at once is frequently fatal, even in the first stage; and whenever the whole of one lung is involved, there is much peril of an unfavourable issue. Cases do occur, however, although rarely, in which the gravity of the case does not bear proportion to the extent of the inflammation; and these anomalies in great measure depend on the natural capacity of the function of respiration in the individual, and its power to bear abridgment. Thus we sometimes see a pneumonia of small extent occasion orthopnœa and other symptoms of a severe case; whilst in another example auscultation may indicate that nearly a whole lung is involved, yet the patient is scarcely sensible of dyspnœa, and the other functions are not greatly disordered.

Inflammations attacking the superior lobes and root of the lungs are more fatal than those confined to the base or lower lobes; and this circumstance explains the discrepancy of authors, before noticed, respecting the comparative frequency of inflammation in these different parts. The cause of the difference appears to be, that disease of the upper portions and root of the lungs obstructs the passage of blood and of air in the larger vessels, so that the peripheral parts unaffected with inflammation do not receive their due supply.

The complication of pneumonia with other affections generally increases the danger of a case: thus peripneumonies supervening in the course of fevers and the exanthemata are generally of a serious nature; and the more formidable because they are often latent. Inflammatory affections of the gastro-intestinal canal, coinciding with pneumonia, render it less tractable and more dangerous; and the same may be said of bronchial, pericardial, meningeal, and peritoneal inflammations. Pleurisy, as we have seen, may diminish the intensity of the inflammation, if it is on the same side; but if it attacks the opposite cavity, it must aggravate the functional disorder. Pneumonia occurring in the course of phthisical disease is seldom severe in itself, but it has a tendency to accelerate the development and softening of the tubercles. This inflammation is more than usually fatal during pregnancy and in the puerperal state. It is especially dangerous at the extremes of life, more particularly in weakly infants and in cachectic old people, and those exhausted by habitual excesses; and the fatality is much greater among the lower classes than among those well and regularly fed and clothed. Mr. Chomel observes that the mortality in hospitals amounts to a fourth of the cases, which is considerably more than what occurs in private practice. The same physician gives the following statement respecting the influence of age in the mortality of pneumonia: in seventy-nine cases, of thirty-three at ages between 18 and 30 years, three died; of nine aged from 30 to 40, two died; of eleven aged from 40 to 50, five died; of fifteen aged from 50 to 60, eight died; of eight aged from 60 to 70, four died; and the three cases which occurred beyond the age of 70, all terminated fatally. (Dict. de Méd. t. xvii. p. 233.)

The state of the functions in pneumonia, although it is not sufficiently constant to be of much use in determining the diagnosis, is often an important guide to the prognosis of individual cases. Thus a severe degree of dyspnœa, when constant, increasing and unyielding to treatment, may justly excite our serious alarm; and the more so as it is conjoined with a state of the circulation which betokens a continued predominance of irritation, or a failure of functional strength. Thus, when in a case of severe dyspnœa the pulse is very quick, as above 120, without much strength, there may be reason to fear that the system may not bear the treatment necessary to arrest the course of the disease, and our opinion must be in a proportionate degree apprehensive: the knowledge, through the physical signs, that the inflammation in its second stage is the cause of this state of the symptoms, will diminish our hopes, as we know it to be then less within the power of medicine; and when the pulse becomes small, weak, and intermitting, the danger may be considered imminent. There may, however, be extensive and serious disease without exciting this combination of symptoms; and although their presence positively indicates danger, their absence does not always represent safety. An obstinate cough, with scanty or difficult expectoration, is an unfavourable symptom, both because it indicates that there is no vicarious relief from the bronchial mucous membrane, and because the very exertion of coughing never fails to aggravate the disease and wear the strength. The character of the expectoration is one of the most valuable indices which we possess for the estimation of the gravity of a case. In simple pneumonia the viscidity and rusty tinge of the sputa are in exact proportion to the intensity of the inflammation, and their increase in quantity and diminution in tenacity and colour are the common attendants of its resolution. Scantiness or absence of expectoration, when other signs prove the existence of a considerable inflammation, is a bad sign, for the reason before mentioned. Dirty or brown watery sputa, and those containing pus, import great danger, inasmuch as they indicate the probable supervention

of the third stage, and a gangrenous odour generally implies a state of great peril. The indications of the expectoration are rendered less certain when bronchitic or catarrhal disease is combined with the pneumonia; and the same remark may be applied to the complication with phthisis. The sudden suppression of expectoration is generally an unfavourable symptom; it is peculiarly so when auscultation discovers a general mucous rhonchus in the chest, because it proves that the muscular powers are inadequate to expel the accumulating matter from the bronchial tubes; and a suppressed secretion of sputa, unless it is the obvious result of a diminution of the inflammation, generally tends to increase it. Pneumonia is frequently resolved without any increase of the expectoration; but when this increase does occur, it always has a favourable influence, and contributes greatly to the cure. A dry harsh state of the skin often attends bad cases complicated with gastric disease, with a loaded parched tongue, great thirst or sickness, and tenderness of the epigastrium. A moderately perspirable skin is the most favourable state; profuse perspirations sometimes occur in fatal cases. The same has been remarked of diarrhœa; yet, as we have before mentioned, both these discharges occasionally prove critical; it is expedient therefore to hold in view, what we have before suggested, that they are to be considered as critical only when they accompany a manifest improvement in the other symptoms. A copious deposit in the urine may generally be viewed as a favourable sign; and the observation of Hippocrates seems to be commonly true, that if, after having been turbid, the urine becomes clear before the fourth day of the inflammation, a fatal tendency may be apprehended. Delirium is generally considered to be a symptom of great danger, and it is the more so when it is constant, and not merely the temporary effect of the nightly febrile exacerbations; but in hysterical females it is often the effect of the treatment, and portends no evil. A comatose or lethargic state is an equally fearful case, as it shows that the functional disorder has already greatly encroached on that strength which is required to bear the treatment necessary for the reduction of the inflammation. The continuance of the various symptoms of inflammation without abatement, notwithstanding the administration of the proper remedies, is always a just reason for apprehension as to the issue.

[Statistical investigation has shown, that pneumonia proves fatal in an increasing proportion after the 20th year, infancy being excepted. Chomel (art. *Pneumonie, in Dict. de Méd.* xxv. 200, Paris, 1842,) found the mortality of persons below 20 to be, at the Hôtel Dieu, in a period of ten years, from 1832 to 1842, in persons from 15 to 20 years of age, 2 in 59, and in both of the fatal cases the individuals were enfeebled by anterior diseases; but between 20 and 40 it rose to 1 in 8; and between 40 and 60 to 1 in 5. It would seem that females are much less favourable subjects for the disease than males,—the mortality in the former being, in the experience of M. Grisolle, (*Op. cit.*) from one-third to one-half greater.]

IV.—Treatment of Pneumonia.

In our examination of the pathology of this disease we found ample proofs that it is an inflammation largely affecting the system of blood-vessels, and that, whatever share nervous irritation may have in exciting or supporting it, these vessels are its peculiar seat, and through them is produced its peculiar mischief. We have moreover seen that in the greater number of cases a congested state of these vessels is the immediate effect of the application of the exciting cause, and precedes that complication of nervous and vascular motions which constitutes reaction and inflammation: we have likewise had many occasions to perceive the serious relations which the disease when formed bears to the two functions most essential to life, respiration and circulation; and the result of all these investigations is to lead us rationally to the recommendation of that mode of practice which the experience of ages has already sanctioned. Pneumonia in its acute form may be called an exquisite type of inflammation, and it is, more than most other inflammations, the proper object for those measures which are called antiphlogistic, and of which bloodletting is the chief. The treatment of other inflammations may require modifications and qualifications because the vessels which they affect may be related to a secretory function, or they may be small and unimportant, or there may be more of nervous irritation than of vascular orgasm, or there may be a coexisting depressing influence in the system; and thus it is that in inflammations of the mucous membranes, of glands, of cutaneous and muscular tissue, of tendons, fasciæ, and nerves, and, in some cases, of serous membranes, bloodletting is less effectual, and requires more limitation than in the disease which we are now considering. This measure, it is true, is not all-powerful in pneumonia, but there are few practitioners who do not admit it to be by far the most important in the early stages: we shall see the limits of its efficacy in rationally examining the subject. Every one who has studied the phenomena of inflammation must be aware that they do not depend entirely on the quantity of blood in the system; and although we greatly reduce this, we may still leave unaffected the state of the inflamed vessels, which remains as a present cause of disorder to the function of the part, and the focus of a speedy return of inflammatory reaction. This may be said of pneumonia even in the first stage; but the second is obviously still less under the control of bloodletting, which, although it may act favourably in preventing an increase of inflammation and in reducing the mass of fluid to pass through the disabled organ, has little or no effect on the solid effusion which now constitutes the organic mischief. Here, then, we have to seek for other remedies to aid the operation of bloodletting, and to resort to where its beneficial operation ceases; and it is an advantage, which modern medicine has to boast of, that it does possess means which are of considerable efficacy in fulfilling these intentions. We are not sufficiently assured of the mode of operation of some of these remedies to be able to class them with certainty as fulfilling specific therapeutic indications, and we shall therefore act more safely by adopting a more empirical course; first describing them under their respective names, and afterwards considering their com-

bined application in the treatment of individual cases.

Bloodletting.—Almost all medical writers, ancient and modern, concur in their testimony as to the advantages of this measure in pneumonia; so that even Laennec, who depended on it much less implicitly than most others, said that "its employment had been proscribed only by some few theorists and medical heretics." (Dr. Forbes's translation, second edit. p. 244.) But there is a considerable diversity of opinion as to the extent to which it ought to be carried, the period of the disease during which it is beneficial, and the best method of practising it. Many ancient physicians, and Galen among the number, recommended the bleeding in pneumonia to be carried to syncope, whatever be the period of the disease; and this practice has been followed by many of the present day, especially in this country. Cullen advises that blood be drawn either until there be remission of the pain and relief of the respiration, or, if these do not appear, until symptoms of a commencing syncope come on. This, we believe, is the plan most commonly pursued in this country, and at this first bleeding a quantity varying from sixteen to forty ounces of blood may be taken before either of these effects is produced. By some practitioners a much larger quantity has been taken without inducing syncope, even to the amount of seventy or eighty ounces; but we consider it doubtful whether it is ever advisable to exceed the highest quantity before stated. Cullen observes that a first bleeding, however large, will seldom prove a cure of the disease, and as the pain and other symptoms recur, the measure must be repeated, even in the course of the same day, to as full an extent as before; and although its greatest efficacy is in the first three days, this recurrence will make a repetition of the measure proper at any period of the disease, especially within the first fortnight. With this practice may be contrasted that of many continental physicians, who never take more than twelve or sixteen ounces daily, and limit the bleeding to the first two or three days, under the apprehension that larger and later depletions interfere with the natural crisis of the disease. We even find Pinel and Brichetau strongly deprecating the free use of the lancet, and inculcating the precepts of Hippocrates, Stahl, Boerhaave, and Van Swieten, to treat mild peripneumonies only by diluents, expectorants, fomentations, pediluvia, and abstinence; and declaring that one or two bleedings at the commencement are all that are generally useful in the severer cases. It is a satisfactory proof of the superiority of the English method of practice to find that the best authorities in France now advocate free depletions much more than formerly. Andral and Chomel recommend bloodletting to sixteen or twenty ounces, practised, if necessary, two or three times a day during the first days of the disease, and more moderately afterwards. Some of their countrymen still more recently have prescribed two or three pounds to be drawn every twelve hours at the commencement of the inflammation, and if the dyspnœa continues, eight to twelve ounces daily afterwards. We may remark, as a partial excuse for the tardy adoption of these more energetic measures by continental practitioners, that probably many of the *mild peripneumonies*, described formerly as cured without bleeding, were in reality cases of bronchitis, and that an improved pathology and method of diagnosis have proved to them what pneumonia really requires. We now know fully, and we are indebted principally to our foreign brethren for this knowledge, that pneumonic inflammation tends much more strongly to effusion and disorganization than to resolution; and our study of the pathology has pointed out, in a very striking manner, that the spontaneous relief of an extensive plexus of vessels gorged with blood, and under the immediate influence of an irregularly excited heart, is too improbable an event to be thought of otherwise than as an exception, the general rule being to an increase of the engorgement, and a progressive encroachment on the proper state and office of the organ. Expectant medicine, in such a case, is therefore both irrational and dangerous.

There are, we presume, no practitioners in this country who question the superior utility of free bloodletting, as early as may be after the development of the inflammation; and it is generally admitted that the measure is more effectual when the blood is drawn from as large an orifice and as speedily as possible. The impression on the circulation is thus more readily produced, and at less expense of blood, than where the aperture is small and the detraction more gradual, scantier, and more frequently repeated. With a view to this effect, Aretæus advised that a vein in each arm should be opened simultaneously, and this plan was adopted by Huxham and Husson. There is, however, a limitation to the advantage of this sudden impression on the system; and this limit seems to us to depend on the degree in which the disease has become fixed in the pulmonary vessels. In the first hours of the inflammation such a sudden loss of blood in the semi-erect posture as will make the pulse soft and weak, and induce some feeling of faintness, will often restore the balance of the circulation, and enable the inflamed vessels to recover their wonted calibre; so that, although some general reaction follows the approach to syncope, the seat of the disease does not suffer from its effects. But if the inflammation has subsisted longer, the inflammation is rarely thus cured by a single bleeding; the vessels of the lungs remain distended although syncope be induced, the depressing effect of the depletion is of short continuance, and the returning reaction brings back the inflammation in its former character. On this account, when the inflammation has lasted more than twelve hours, we are distrustful of a syncope induced by a small bleeding, and we have generally found it necessary to repeat the venesection sooner and more frequently than where more blood has been drawn at first, and only a tendency to faintness produced. Cullen has justly remarked that many persons faint even upon a small bleeding, and as this may prevent the drawing as much blood at first as a pneumonic inflammation may require, it is the more necessary in these cases to repeat the measure more largely afterwards. Early fainting should therefore be rather avoided than desired, and if the patient feels it approaching when only a few ounces have been extracted, and little relief is manifested in

the symptoms, it is expedient to stop the orifice, and to let the patient lie down for a few minutes, which, with the aid of a little cold water and a smelling-bottle, will restore the circulation to a state in which it will bear the necessary depletion. The quantity to be drawn may vary in different adult subjects according to the age, constitution, extent of the inflammation, &c., from twenty to forty ounces. If it is known that the patient bears bleeding well, the larger the orifice and the speedier the loss of blood the better; but nervous subjects, and those liable to palpitation and fainting fits, must be coaxed more gradually to bear a full depletion, and guarded from a fictitious syncope by the horizontal posture. If these precautions are neglected, the disease will continue to gain ground in spite of the apparent impression on the circulation, and each hour lost will diminish the beneficial influence of subsequent depletory measures. Much discretion is required in determining the quantity of blood to be drawn, and this determination can never be satisfactorily made beforehand; within the limits just named, therefore, the immediate effect of the operation is the only sure guide. In the first stage of the inflammation, whilst the crepitant rhonchus prevails, and there is little or no dulness on percussion, bloodletting shows its greatest efficacy, and the more so even when this stage is recent. Hence, as we have already remarked, one full, speedy bleeding of thirty ounces, or thereabout, instituted within the first few hours, will often prove sufficient to destroy the orgasm, and relieve entirely the dyspnœa and pain; the remaining quickness of pulse and cough yield to subsequent milder treatment; and the knowledge of its superior efficacy at this time may authorize us to carry the depletion beyond the point of producing relief to the symptoms, and even to the verge of syncope. After the first twelve hours have elapsed, and when the stethoscope discovers no remains of respiratory murmur mixed with the crepitant rhonchus of the affected part, there is little chance that a single bleeding will prove sufficient; and although, when well borne, it may be carried to forty ounces, more regard must be paid to avoid syncope than in the first instance. This is the more necessary when the crepitant rhonchus is on the decline and becomes mixed with bronchophony, and the part sounds dull on percussion, signs which prove the transition to the second stage. As this becomes formed, as the disease obtains a physical hold of the part, full and sudden impressions on the circulation lose much of their beneficial influence; and they are to be sought for only when the first stage of inflammation still prevails and spreads in another part of the pulmonary tissue. If we are called to a patient with a lung already hepatized, and on whom bloodletting has not yet been practised, it is generally advisable to bleed, but not with an expectation of complete relief to the symptoms, or with a view to reduce the pulse; the solid effusion constitutes a material cause of the dyspnœa, which no bleeding can remove; and the heart, although sometimes quieted by diminishing the load which it has to propel through an obstructed organ, often becomes more irritable, and rises both in force and in frequency. If the bleeding is carried to syncope at this stage, it is commonly succeeded by a reaction, which aggravates the dyspnœa and adds to the disorder of the hurried circulation. Bloodletting is not the chief remedy in this stage, and, even where used for the first time, it should be restricted to the object of aiding other measures, and not pushed to the length of inducing syncope.

All the advocates of bleeding in pneumonia admit the necessity of repeating the measure in case of the continuance or recurrence of the symptoms of inflammation, and it is in the steady and discreet perseverance in this measure, notwithstanding a variety of phenomena which may seem to oppose it, that the scientific and experienced physician shows his skill and proper firmness. The temporary relief afforded by the first bleeding may have given place to an aggravated dyspnœa, and the pulse may have become weak, contracted, and very quick; symptoms of great debility may have shown themselves; and the patient may express feelings of faintness and exhaustion, which seem to be further evinced by his indisposition to any exertion or movement unconnected with his efforts to breathe. This array of discouraging indications deters the timid practitioner from again resorting to the lancet, and he finds in certain authors a sanction for a supine course, in their cautions, that if the bleeding be pushed far, the disease will become typhoid, the expectoration arrested, and the frame thrown into a state of hopeless debility. As long, however, as the physical symptoms indicate the continuance of the first stage of inflammation, except in a few cases to be presently noticed, there should be no hesitation freely to repeat the bloodletting any number of times until the symptoms are relieved; and it has been proved by ample experience that this treatment, instead of giving rise to a typhoid state, and facilitating effusion, prevents these events by arresting their real cause, the inflammation and its extensive injury to the respiratory function. These are far more formidable and deadly than the consequences of even an immoderate loss of blood, and we can add our testimony to that of Dr. Mackintosh when, after cautioning against excess in the use of this measure, he says, "nevertheless I am persuaded from experience in treating the disease, and from examinations after death, that much more mischief is done by bleeding too little than by bleeding too much." (Practice of Physic, vol. ii. p. 424.) It is the delay or insufficient application of this measure at first, that often throws the disease into that apparently typhoid form which has deceived so many as to its real cause; and nothing but the actual experience that the pulse frequently rises in force and fulness, the breathing becomes easier, the lethargy or sinking and the anxiety of the countenance become diminished, and the strength increased, as the pernicious oppression of the respiration is relieved by repeated bleedings, can impress the mind fully with the safety and expediency of the measure. "How often," says Andral, "have we not seen bloodletting employed with the greatest advantage in individuals in whom the pulse was small and contracted, the face pale, the extremities nearly cold, the general debility

apparently very great, but in whom at the same time the respiration was greatly oppressed." (Clin. Méd. t. ii. p. 380.)

We do not maintain that there are no cases in which the disease is from the beginning connected with a truly adynamic form of fever, and in which bleeding, even to a small extent, and however carefully managed, causes faintness without relief. This occurs sometimes in those whose vascular system has been greatly debilitated by excess in ardent liquors, and in those of a strongly scorbutic diathesis; it sometimes prevails epidemically at the same time as other typhous diseases, and changes the character of the peripneumonies that may then happen to prevail. It may be almost a question whether in these cases the local disease in the lungs is not rather a congestion of blood in an altered state than an inflammation, and it is very commonly the sequel rather than the cause of the fever. At all events, the impropriety of the free use of bloodletting is obvious from its effects, and our chief reliance must be on other measures.

With regard to the time in which it will become proper to repeat the measure, much will depend on the severity of the case and the success and extent of the first bleeding. If this was copious, and produced signal relief to the dyspnœa and pain, its full effect will not be apparent for four or five hours, during which time further benefit may follow from the use of other remedies; at the end of that time the patient should be seen again, and if he should be found still to suffer, and especially if there have been any increase of dyspnœa, the bleeding must be repeated with freedom, either until some relief be manifest, or till an impression be produced on the circulation. If the first bleeding failed from the speedy supervention of syncope before much blood was drawn, it will be necessary to repeat the visit in an hour or two, and again to make trial of the measure, when the patient will often be found to bear a much larger bleeding than at first, and with proportionate and more permanent relief to the symptoms. The pulse furnishes a much less certain indication for the use of the lancet than the state of the breathing, which is the function which we should be most anxious to relieve. In the first stage it rarely happens that bleeding will not produce some immediate relief of this kind as well as of the attendant pain, and this effect may generally guide us in the extent to which we may carry the measure. If, however, although the bleeding seems little affected, during the flow of the blood at this repetition of the practice the pulse becomes very weak, quick, and running, it is expedient to stop the bleeding and trust to local depletion and other remedies. It cannot be denied that this intolerance of bleeding shows itself in some rare instances from the very commencement of the disease, giving to it the real typhoid type; this character, however, has been ascribed to a greater number of cases than deserve it, and we cannot be too careful in our endeavour to distinguish the real from the false cases of vascular debility: the distinction can seldom be so satisfactorily made as by the cautious trial of venesection itself. Laennec has, it is true, pointed out one test, which is sometimes of great use and certainty, in the state of the action of the heart as investigated by the stethoscope; when, amidst symptoms of general debility, the pulsations of the heart are heard and felt more strongly in proportion than the arterial pulse which they not unfrequently are, especially under the sternum, there can be no fear of bleeding, however weak the pulse may seem; but if they are both weak, the detraction of blood will almost always occasion complete prostration of strength. (Op. cit. p. 249.) There is an exception to this rule in the complication with hypertrophy of the heart, in which the pulsations continue to be apparently strong when the circulation is really very weak. The palpitation of reaction after loss of blood in nervous subjects may likewise be mistaken for the strong pulsations of Laennec; and this error is the more to be avoided as this reaction often accompanies a state of the circulation which will not bear bloodletting.* A good auscultator may distinguish the palpitation of reaction by its louder sound and more abrupt but less forcible impulse than those attending the really sthenic pulsations of the heart; but some experience in auscultation is required to make this distinction available in practice. Although, therefore, this test is very useful in deterring us from venesection in some cases of real debility, yet where it seems to indicate the use of this measure, it must not make us neglect the careful study of the effects as the blood flows from the vein.

In the second stage of inflammation, when dulness on percussion and the absence or the bronchial character of the sound of respiration indicate hepatization of the lung, bloodletting loses that efficacy which entitles it to the foremost place in the remedies for pneumonia. Some writers, indeed, proscribe its use at this period, as injurious and interfering with the curative process. The ancient physicians generally renounced bleeding after the fifth day if the expectoration was abundant, for fear of checking it, and their caution was followed by most practitioners until the end of the last century. We can readily perceive that the efficacy of bloodletting must be very much abridged by the permanent form which a solid interstitial effusion has now given to the organic disease, and therefore it is no longer to be expected that its repetition, however copious or frequent, can at once remove the dyspnœa or lower the pulse; but in a more moderate degree it is still useful, inasmuch as it reduces the quantity of blood which is to pass through the lungs, and tends to prevent the progress of the inflammation to the third and more hopeless state, purulent infiltration. We find, accordingly, many excellent practical writers, Stoll, Cullen, Frank, De Haen, Andral, Chomel, and even Laennec, recommend the repetition of venesection during the second and even the third stage, whenever the state of the breathing, the pain, or the fever seem to require it. Laennec thought that to bleed to syncope might produce the evil effect of checking the

* In hysterical females especially, this and other symptoms of nervous excitement, as pain, delirium, and convulsions, often occur and deceive the unwary as to their real cause; they are not dependent on the disease, but on the loss of blood, and belonging to the class of irritations of reaction, require sedatives rather than further depletory measures. (See IRRITATION.)

expectoration, apprehended by former writers, and in this opinion our own experience disposes us to coincide. If venesection has been freely practised before, the occasional loss of eight or ten ounces from the arm, conjoined with local depletions, is generally as much as is borne well or proves useful, and the further relief of the disease must be left to other means. In some instances this quantity may be exceeded with advantage, even at this period, when the stethoscope discovers the development of inflammation in a new part. If, likewise, bleeding has been neglected, or only sparingly used before, a larger abstraction is often serviceable, even in the second stage, to remove that relative plethora into which the obstructed state of the lungs converts the ordinary fulness of the vascular system, and hence the great relief that even at this period general bloodletting sometimes affords. Here, it may be perceived, there is no reason for a large orifice or a speedy abstraction of blood, and these should be the rather avoided, as the syncope which they may induce is not a desirable event.

[It is maintained by M. Louis, (*Researches on the Effects of Bloodletting in some Inflammatory Diseases*, &c., Boston 1836,) from the results of numerical observations, that the influence of bleeding, when performed even within the first two days of pneumonia, is less than has been supposed, and that in general its power is very limited; that its effect, however, on the progress of the disease is found to be happy, and that patients who were bled during the first four days recovered—other things being equal—four or five days sooner than those bled at a later period. The researches of M. Louis gave occasion to numerical investigations, as to the effect of bloodletting in pneumonia on this side of the Atlantic. (Dr. James Jackson, in *Translation of Louis on Bloodletting*, cited above.) Of 31 cases, treated at the Massachusetts General Hospital, in three, bloodletting was practised on the first day of the disease. The average duration was $13\frac{1}{3}$ days. The number of bleedings in each case was four; and the average quantity of blood, abstracted in each, $61\frac{1}{3}$ ounces. In 15 cases, which were bled for the first time, on the first, second, or third day, the average duration was $12\frac{1}{3}$ days. The same thing was true, with a slight difference, of 21 cases in which bleeding was practised on or before the fourth day. In five cases bled for the first time after the fourth day, the average period of convalescence was $13\frac{1}{5}$ days. In these 26 cases, the average duration of the disease was $12\frac{1}{3}$ days. In five cases, bloodletting was not employed, except in one in which six leeches were applied. The mean duration of the disease was $14\frac{3}{5}$ days. So far, therefore, as these cases go, it would seem that the effect of bleeding, on or before the fourth day of pneumonia, is to shorten its course nearly one day, when compared with the cases in which it was not employed until after that period. Compared with those who were not bled, it was shortened a little more than $2\frac{1}{4}$ days. These results are certainly confirmatory of those of M. Louis, which led him to infer, that bleeding does not exert so powerful an effect on pneumonia as is generally believed; but they are not sufficient to induce us to discard this important remedy, or to place as little reliance upon it as has been done by some. It is questionable whether it ever succeeds in cutting the disease short. The remarks of M. Louis on this point are very explicit. His conclusion is;—"that we cannot cut short pneumonia by bloodletting, at least during the first days of the disease." It must be admitted, however, from the testimony of most observers, that in strong and vigorous subjects, general bleeding is an important remedy; yet it must be equally admitted, from the same testimony, that it ought not to be practised at all periods; and that after the stage of engorgement has passed into that of solidification, and, *à fortiori*, when it has entered that of interstitial suppuration, it may be a very questionable or improper agent. When the practitioner is called early, a copious bleeding, which exhibits its effects upon the morbid manifestations, but short of inducing syncope, may be sufficient. One single venesection of this kind, carried to the extent of relieving the pain in the chest, of permitting the patient to take in a deep inspiration, and of converting the small, rapid and oppressed pulse into one that is large and full—has been found more efficacious than four practised at a later period. In 180 cases, according to Dr. Most, (art. PNEUMONIA, in *Encyclop. der Gesammt. Medicin. und Chirurg. Praxis*,) it was found necessary in two only to repeat the bloodletting on the same day, or at the next exacerbation. Dr. Stokes, too, states, (*On Diseases of the Chest*, 2d Amer. edit. p. 307, Philad. 1844,) that he has found the bold and repeated use of the lancet to be unnecessary, and he is convinced, that, in general, a single bleeding, or at the most, two bleedings will be sufficient. Out of many hundred cases he has had only one in which it was necessary to bleed oftener than twice: in that instance, there was hypertrophy of the heart.]

We have said nothing respecting the buffy coat of the blood as a criterion of the propriety of venesection, because we have not observed any constant relation between this sign and the intensity or even the existence of inflammation. When the crassamentum is buffed, cupped, and firm, early in the disease, it may confirm us in persevering in the measure; but in the after stages, the separation of the fibrine from the colouring matter may proceed as much from irritation or the use of mercury as from inflammation, and it is at this time only that its indications are wanted.

Local bloodletting.—It is obvious that, in the greater number of cases, the abstraction of blood from the integuments of the chest can produce but little impression on a disease that occupies so considerable a portion of the vascular system as that extensive tree of vessels which conducts the smaller circulation; and accordingly local depletion is but a subordinate measure in the treatment of pneumonia. [Dr. Stokes, however, (*Op. cit.*) considers it the principal remedy.] Many practitioners, however, often employ leeches or cupping as subsidiary to phlebotomy at the commencement of the disease. Thus Andral tells us that Lerminier often ordered the painful side to be covered with leeches during the flow of blood from the vein. This method, it may be remarked, is better adapted to an hospital, where there are plenty of experienced assistants, than to private

practice, where one of these operations is enough at a time: but we have found great advantage in prescribing local bloodletting in the space of an hour after general, especially where a stitch in the side indicated the extension of the inflammation to the pleura. From twenty to forty leeches followed by a large cataplasm, or from ten to sixteen ounces of blood drawn by cupping, often not only have the effect of relieving a pain which greatly aggravates the difficulty of breathing and cough, but also in some degree prolong the depression resulting from the general depletion, and prevent the bad effects of a reaction which sometimes succeeds to this depression. In aged and exhausted subjects, and in those cases of real adynamic pneumonia which do not bear venesection, this local bloodletting becomes a principal remedy, and although much inferior in efficacy, and less worthy of our confidence, it must often be our resource when the strength would sink under general depletions. In infants the bleeding from leech-bites is equivalent to a general bloodletting, and below the age of two years is very commonly substituted for it. It may be suggested, however, that about and above this age, when, in the early stage of the inflammation, the symptoms are pressing, it is better to use venesection; and if there should be any difficulty in bleeding from the arm, from four to eight ounces may be taken from the jugular vein with great advantage; but if depletion be again necessary, that by leeches will be generally sufficient. It is sometimes recommended to apply a leech or leeches to the foot or arm of infants, suffering under inflammatory diseases, because the bleeding can better be controlled in those parts; but the greater benefit produced by the depletion near the affected organ leads us to apply them in preference close to the sternum, or under the clavicle of the affected side; we have never experienced any difficulty, when it became necessary, in stopping the hemorrhage by a compress and bandage or slips of adhesive plaster. In adults, when leeches are used as local depletories, the intercostal spaces nearest to the point of pain are the best place of application; for contiguity, independently of vascular communication, affects the removal as well as the propagation of inflammation.

In the second and third stages of pneumonia local bloodletting may sometimes be substituted for venesection, on any return of pain or slight increase of dyspnœa which seems to demand more immediate relief than can be obtained from the internal remedies or blisters. In slight limited inflammations, such as those attacking phthisical subjects, it is often the only kind of bloodletting that is necessary.

Tartar-emetic.—Next to bloodletting this remedy is perhaps the most powerful that we can employ for the cure of acute pulmonary inflammation. Its utility in emetic and in nauseating doses had long recommended it in pectoral complaints, but its power of subduing acute inflammations independently of its emetic, nauseating, or diaphoretic effects, has been only of late years developed. Rasori of Genoa was the first who established it,* and besides the testimony of many of his own countrymen in its favour, it has received the highest and most unqualified praise from the illustrious Laennec, whose sanction, after the great light which his labours have thrown on the pathology of this disease, cannot but command our attention. Although it may fall short of the sanguine hopes held out by the advocates of this practice abroad, the experience of many distinguished physicians in this country tells much in its favour, and we believe justifies the opinion expressed at the beginning of this paragraph. The success which has attended the treatment of peripneumony by repeated emetics, as recommended by Riverius and Stoll, probably in part depended on this peculiar action of tartar-emetic; under this practice in the hands of Dr. Hellis of Rouen, and some others in France, the proportion of deaths was considerably less than usual, not exceeding one in nine; while the average mortality of the disease, when treated by bloodletting and derivatives, amounts to one in six or eight, (*Laennec*, p. 261); and in hospital practice, and among the lower ranks, it is often greater. The efficacy of the emetic treatment in croup, advised by Dr. Cheyne, and in ophthalmia and in hernia humoralis, probably partakes of the same principle, and is less dependent on the emetic than on the *contro-stimulant* or *anti-inflammatory* effect of the tartarized antimony. As the subject of large doses of tartar-emetic has been already described in the article Inflammation, we shall here only speak of its application in the treatment of pneumonia.

Rasori, with whom the regular introduction of this practice commenced as long ago as the year 1808, gave the medicine in the following manner. Usually after one or more bleedings, but sometimes without this measure, from twelve to twenty-four grains, or in severe and advanced cases, from a scruple to half a drachm were given during the day, and the same repeated in the night; these doses were daily increased until they amounted to a drachm or several drachms in the twenty-four hours. The result of this extraordinary practice was, that out of 832 cases of pneumonia 173 died. Out of 115 cases treated in the same way by Tomassini of Bologna, only 14 died; and several other equally favourable reports are made by other physicians of Italy. There are, however, counter-

* Although we yield thus much to a foreigner, we must not pass over a just claim to priority in *practice* in favour of Dr. Marryat of Bristol, who died in 1793. In the last edition of his "Therapeutics," published in 1790, is the following passage, in which both the febrifuge virtue of tartar-emetic, and the *tolerance* of the system in regard to it are described. "Any fever may be soon extinguished by the use of the following powders:—Take of tartarized antimony five grains, white sugar (or nitre) a drachm; let them be well rubbed in a glass mortar, and divided into six powders; one to be taken every three hours, notwithstanding the nausea the first may possibly occasion. If these are taken, (which is commonly the case) without any manifest inconvenience, let there be seven grains in the next six powders; and in the next ten. Here I beg to retract what I said in some former edition of this work, viz. that till sickness and vomiting were excited, this noble medicine was not to be depended upon. For I have since seen many instances wherein a paper has been given every three hours, (of which there have been ten grains in six powders,) without the least sensible operation, either by sickness, stool, sweat or urine, and though the patients had been unremittingly delirious for more than a week, with subsultus tendinum and all the appearances of hastening death, they have perfectly recovered without any medical aid, a clyster every other day excepted. I have lately seen a great many cases similar to the above, and the tartarized antimony has invariably produced the same effect."—See Medico-Chirurg. Review, No. 31. p. 253.

statements to oppose to these;* and, as we had occasion to observe when speaking of the neglect of bloodletting, we have no certainty that all the cases here enumerated were in reality pneumonic. At all events, later experience has proved that there is no advantage in the excessive doses here used, and, on the contrary, that greater success has resulted from more moderate quantities. The uncommonly small mortality of only two in fifty-seven, which Laennec asserts to have attended his method of exhibiting tartar-emetic, warrants our quoting his own account of his treatment, which will likewise show how much confidence he placed in the measure.

"As soon as I recognise the existence of the pneumonia, if the patient is in a state to bear venesection, I direct from eight to sixteen ounces of blood to be taken from the arm. I very rarely repeat the bleeding, except in the case of patients affected with disease of the heart or threatened with apoplexy or some other internal congestion. More than once I have even effected very rapid cures of intense peripneumonies without bleeding at all; but in common I do not think it right to deprive myself of a means so powerful as venesection except in cachectic or debilitated subjects. In this respect Rasori does the same. I regard bloodletting as a means of allaying for a time the violence of the inflammatory action, and giving time for the emetic tartar to act. Immediately after the bleeding I give one grain of the tartar-emetic dissolved in two ounces and a half of cold weak infusion of orange leaf, sweetened with half an ounce of syrup of marsh-mallows or orange-flowers; and this I repeat every second hour for six times, after which I leave the patient quiet for seven or eight hours, if the symptoms are not urgent, or if he experiences any inclination to sleep. But if the pneumonia has already made progress, or if the oppression is great, or the head affected, or if both lungs or one whole lung is attacked, I continue the medicine uninterruptedly, in the same dose, and after the same intervals, until there is an amendment not only in the symptoms, but also indicated by the stethoscopic signs. Sometimes even, particularly when most of the above-mentioned unfavourable symptoms are combined, I increase the dose of the tartar-emetic to a grain and a half, two grains, or even two grains and a half, without increasing the quantity of the vehicle. Many patients bear the medicine without being either vomited or purged. Others, and indeed the greater number, vomit twice or thrice, and have five or six stools the first day; on the following days they have only slight evacuations, and often, indeed, have none at all. When once the *tolerance* of the medicine (to use the expression of Rasori) is established, it even very frequently happens that the patients are so much constipated as to require clysters to open the body. When the evacuations are continued to the second day, or when there is reason to fear on the first that the medicine will be borne with difficulty, I add to the six doses to be taken in the twenty-four hours, one or two ounces of the syrup of poppies. This combination is in opposition to the theoretical notions of Rasori and Tommasini, but has been proved to me by experience to be very useful. In general, the effect of tartar-emetic is never more rapid or more efficient than when it gives rise to no evacuation; sometimes, however, its salutary operation is accompanied by a general perspiration. Although copious purging and frequent vomiting are by no means desirable on account of the debility and hurtful irritation of the intestinal canal which they may occasion, I have obtained remarkable cures in cases in which such evacuations had been very copious. I have met with very few cases of pneumonia where the patient could not bear the emetic tartar; and the few I have met with occurred in my earliest trials; insomuch that this result now appears to me to be attributable rather to the inexperience and want of confidence of the physician, than to the practice. I now frequently find that a patient who bears only moderately six grains with the syrup of poppies, will bear nine perfectly well on the following day. At the end of twenty-four or forty-eight hours at most, we perceive a marked improvement in all the symptoms. And sometimes even we find patients who seemed doomed to certain death, out of all danger after the lapse of a few hours only, without ever having experienced any crisis, any evacuation, or indeed any other obvious change, but the rapid and progressive amelioration of all the symptoms. In such cases the stethoscope at once accounts for the sudden improvement, by exhibiting to us all the signs of the resolution of the inflammation. These striking results may be obtained at any stage of the disease, even after a great portion of the lung has undergone the purulent infiltration. As soon as we have obtained some amelioration, although but slight, we may be assured that the continuation of the remedy will effect complete resolution of the disease, without any fresh relapse; and it is in regard to this point more particularly, that the greatest practical difference between the emetic tartar and bloodletting consists. By the latter measure we almost always obtain a diminution of the fever, of the oppression and the bloody expectoration, so as to lead both the patient and attendants to believe that recovery is about to take place: after a few hours, however, the unfavourable symptoms return with fresh vigour, and the same scene is renewed, often five or six times, after as many successive venesections. On the other hand, I can state that I have never witnessed these renewed attacks under the use of tartar-emetic. In these cases we observe only in the progress towards convalescence, occasional stoppages. And this is more particularly the case in respect of the stethoscopic signs; as we find that between the period when the patient experiences a return of his appetite and strength, and fancies himself quite cured, and the period at which the stethoscope ceases to give any indication of pulmonary engorgement,—more time frequently elapses than between the invasion of the disease and the beginning of the convalescence. It is necessary to observe, however, that this remark is still more frequently applicable to the disease when treated by bloodletting; and moreover, that the patients subjected to the antimonial

* See an interesting and valuable note by Dr. Forbes, in his translation of Laennec, third edit. p. 269. It contains a succinct history of the new mode of exhibiting tartar-emetic, and some very judicious comments upon it.

method never experience the long and excessive debility which too often accompanies the convalescence of those who had been treated by repeated venesections." (Dr. Forbes's Translation, p. 255.)

M. Peschier, of Geneva, appears to have given tartar-emetic much in the same way as Laennec; and with such success that, according to his report, he speedily cured almost every case without the aid of bloodletting, although he never exceeded fifteen grains in the twenty-four hours. (Biblioth. Univ. Juin, 1822.) Of those who have written favourably of the remedy on this side of the channel, we may name Dr. Mackintosh, of Edinburgh, and Drs. Graves and Stokes, of Dublin; but these physicians differ from its foreign advocates in making tartar-emetic a remedy secondary to bleeding. The experience of the former leads him to conclude that vomiting is more speedily produced by a small dose dissolved in a large quantity of water, than a large dose of the drug mixed with a little sugar; but in the latter case the nausea is more severe and of longer continuance than in the former. (Practice of Physic, vol. i. p. 426.) Drs. Graves and Stokes begin with a mixture containing six grains for the first twenty-four hours, and add to this two or three grains each day afterwards, as the severity of the case may require, until fifteen grains are given daily; beyond this quantity they think it unnecessary to go. They use general and local bleeding freely, and in case of an increase of the symptoms, resort to it without trusting to larger doses of the tartar-emetic. They consider the treatment by this medicine as most eligible in strong constitutions in the early stage of inflammation, during the prevalence of the crepitant rhonchus, and before there is any dulness on percussion; when hepatization has taken place, it loses much of its efficacy. Any symptom of gastritic disease they consider as counter-indicating its use; and they find that the *tolerance* of the remedy is sometimes more readily established by applying leeches to the epigastrium. (Dub. Hosp. Rep. vol. v.)

Our own experience in the use of tartar-emetic leads us to agree pretty closely with these observations. In truly sthenic cases of pneumonia, we have generally found that it perpetuates the impression produced by the lancet more promptly and decidedly than any other remedy, and in a proportionate degree ensures the relief of the patient, at a smaller expense of blood and strength than the ordinary method of treatment, even with the aid of mercury. But we cannot assent to the opinion of Rasori, in which Laennec seems to join, that the remedy has no depressing effect except in regard to the inflammation, which it directly reduces; for we have very commonly found that it lowers the strength, and sometimes the frequency of the pulse, before its beneficial effects on the inflammation are perceptible, and occasionally even when these do not ensue. It may have specific effects on the inflamed vessels, but it likewise sometimes exerts a sedative action on the general circulation. This is not always apparent, and its absence may result sometimes from the local irritation of the medicine counteracting its depressing influence, and in some cases from the system being capable of resisting its effects. Certain it is, that in a few instances, principally in children, its administration has been followed by a more rapid sinking, and seemed to hasten the fatal termination. These were, it is true, cases of advanced disease, in which, after death, the lungs exhibited extensive marks of unconquered inflammation. We think it more necessary to point out this depressing operation of tartar-emetic, because Laennec takes no account of it, but considers cases of debility as particularly adapted for its use. Nevertheless we have seen aggravated instances of pneumonia advanced to the second, if not the third stage, and accompanied with great apparent exhaustion, recover under the influence of tartar-emetic and blisters, when bloodletting had ceased to bring relief and was no longer practicable. Unless, however, in case of failure of the action of other remedies, we should not be disposed to give tartar-emetic in any case where the circulation is really weak; and it should likewise be withheld where it appears to depress greatly without improving the state of the respiration.

A very important point in the exhibition of this medicine is to establish the *tolerance*, which means an insusceptibility of the stomach and bowels to its emetic and purgative effects. Rasori supposed that the presence of an inflammation in the system is the cause of the drug having a different operation from usual, and that the stimulus of this inflammation must be neutralized by the directly sedative or *contro-stimulant* property of the medicine before the body can be made sensible of its common emetic effects. But, as Laennec has observed, this is not consistent with the fact, that after the tolerance is once established, ten, twenty, or thirty grains may be taken and continued daily throughout the period of convalescence without any sensible effects. We have seen patients recover their strength, appetite, and power of digestion when they were taking twelve grains daily. The experience which we have that the most inflammatory and plethoric cases are those in which this medicine is most successful, indicates indeed its peculiar power over excited vascular action, but its occasional utility over more advanced forms of pneumonia and in hernia humoralis proves that it likewise possesses a sorbefacient power. (See Dr. Mackintosh's Experiments, Lancet, vol. ii. p. 536.) The directions which we have quoted from Laennec with regard to the best mode of exhibition to ensure the tolerance of the medicine, are those which we have generally found most successful. It is desirable to vary the vehicle according to the taste of the patient, and to choose that which is most grateful to his stomach. We have often found the "king's cup," a weak infusion of fresh lemon-peel sweetened according to the liking of the patient, convey the medicine very comfortably, but it is best not to give more than a wine-glassful with each dose, as in our experience a larger quantity is more apt to produce vomiting. The first dose generally produces this effect however given, and frequently the second more slightly; the third commonly merely nauseates, and the tolerance is then established. This is the common average of the operation of the medicine. If the vomiting continue after the second dose, or be very violent then, i

will be expedient to take some measures to diminish the irritability of the stomach and bowels. Where there is a diarrhœa as well as vomiting, instead of the syrup of poppies recommended by Laennec, we prefer the addition of three or four drops of the liquor opii sedativus, or of the solution of muriate of morphia, to each dose of the medicine, and this may be advantageously given with an effervescing mixture, as recommended by Dr. Tweedie in the article Fever; but it is necessary that the alkaline carbonate should be accurately neutralized, otherwise it would decompose the tartarized antimony. Where the vomiting becomes obstinate and urgent, we can confidently recommend the addition of a drop or two of hydrocyanic acid to each dose of the medicine, as in the following form:

R. Antimon. tart. gr. iss. ad gr. iiss.
Aquæ destill. f.℥i.
Acid. hydrocyan. *mi*.
Aq. cinnamomi, (vel flor. aurant.) f.℥iii.
Syrup. tolutan. f.℥i. Fiat haustus.

This may be given every second, third, fourth, or sixth hour, according to the severity of the case. The draughts should not be made long before they are used, as they soon become decomposed, and the oxide of antimony is precipitated. For this reason it may be sometimes useful to prescribe the tartarized antimony in a powder, to be dissolved at the time of exhibition in a wine-glassful of lemon-peel infusion, to which, if necessary, the hydrocyanic acid may be added. We decidedly prefer the exhibition of the medicine in a liquid form to that of a powder, as we consider it to be more safe and efficacious. Where, notwithstanding the combinations just mentioned, the vomiting still continues, a few leeches to the epigastrium, or, what is more efficacious, a mustard poultice applied there for a few minutes, will sometimes effect the tolerance of the remedy. If, notwithstanding all these precautions, the vomiting persists, it must be left to the discretion of the practitioner whether the medicine is to be continued or not; and in deciding this he will have to balance between the beneficial influence already produced by it, and the distress and injury likely to ensue from so violent an operation still continued.

It seldom happens, however, that this intolerance of the medicine does remain where its continued exhibition would be safe; and unless the remedy should be producing a marked improvement in the pulmonary symptoms, we may generally consider obstinate and violent vomiting or diarrhœa as an indication to desist from its continuance. We are further warned from its use in all cases where there is a florid red, or brown and parched state of the tongue, with great thirst, and tenderness and tension in the epigastrium, or over the whole abdomen. We do not find that a moist furred tongue, whether white or brown, gives any contra-indication, and we have often seen this state removed by the first operation of the medicine. In continuing the medicine we must be guided more by the physical than by the general signs of the disease; and it should not be hastily discontinued, for it does not appear, like mercury, to produce a permanent effect on the system. As long as there is a rusty tinge and viscidity in the sputa, and distinct crepitation, or absence of the respiratory sound in the seat of disease, the medicine should be continued, three times a-day at least. It is an advantage of this remedy that it may be combined with others, adapted to the various stages of the disease; and, although such combinations speak equivocally as to its individual powers, in some of the severest cases in which the treatment was most signally successful, we have joined the tartar-emetic with general bloodletting at first, with blistering and mercury afterwards, and lastly with the decoction of senega or some slight tonic.

Mercury and opium.—The exhibition of these drugs as an antiphlogistic remedy, first practised by Dr. Robert Hamilton, (Medical Commentaries, vol. ix. p. 191,) and afterwards revived and warmly recommended by Dr. Armstrong, (Practical Illustrations of Typhous Fever, &c. p. 453,) is now pretty generally resorted to in this country, and as it has been fully noticed in several preceding articles, need not here long occupy our attention. Like tartar-emetic, it is to be generally considered only as a measure secondary to bloodletting, and the salutary effect is particularly shown when the latter remedy has reduced the inflammatory orgasm, and can be carried no further. The efficacy of this combination depends in a great measure on its being given to such an extent as to affect the gums; but its beneficial operation is often manifest before this effect is produced, and in some cases, especially in children, without its occurring at all. But there is seldom that obvious improvement from the first doses which is often apparent in the exhibition of tartar-emetic; the operation of mercury is more gradual, and, as may be expected, when once the system is under its influence the effect is more permanent. It is therefore especially adapted to the advanced stages of the disease in which the continued operation of a remedy is required to resolve a solidification of the lung; and in effecting this, and in preventing those remains of inflammation which lay the foundation for destructive chronic disease, mercury is pre-eminently serviceable. Some doubt has existed whether the mercury or the opium is the principal agent in subduing inflammation. Dr. Hamilton considered it to be the calomel, and he combined opium with it to relieve pain, and to prevent it from passing off by the bowels. Dr. Armstrong held that the opium was a powerful means of subduing inflammation after bleeding had made a decided impression on the general vascular action. In pneumonic inflammation, however, we cannot but admit that both medicines have their beneficial effects each by its own influence, and by modifying the action of the other. Thus the opium acts as an anodyne in subduing the pain and cough, and as a sedative in relieving that nervous irritation which often follows both bleeding and the free use of mercury, and which tends to the re-establishment of inflammation; whilst the injurious stimulant and restringent operation of the drug is prevented by the previous bloodletting and the mercury. The latter medicine, again, besides this corrigent effect, more gradually exerts that specific antiphlogistic and sorbefacient action which has established its value in many diseases, and of

which the treatment of iritis frequently affords a visible illustration. If we adopt this view as a guide in the application and management of these combinations, we shall find that it leads to the rules which experience has already sanctioned.

Calomel is the form of mercury which is generally preferred in acute inflammations, and as its purgative effect is not an object, there is the greater need to combine it with opium. Dr. Armstrong, indeed, considered the purgative operation of a first full dose of calomel to be salutary, by brushing away the coat of mucus from the intestines, and thus opening the absorbents for the specific action of the medicine: this may with advantage be practised in pneumonia, and especially where a disordered or torpid state of the excretions indicates a purgative. With this view, from five grains to a scruple of calomel may be given immediately after the first bleeding; but as a continued catharsis is seldom desirable, especially where there is free expectoration, the opium should be added to the subsequent doses. With respect to the quantity and frequency of these, some difference must be observed according to the form of the disease. In the most sthenic cases uncomplicated with idiopathic fever or gastric affection, large doses of calomel, of from six to twelve grains, or even more, may be given three or four times a-day with better effect than smaller doses more frequently repeated. The proportion of opium must likewise be varied according to circumstances. Where after a full bleeding the pain is considerable, with little fulness in the pulse, and especially if there are signs of nervous irritation, from a grain to a grain and a half of opium may be added to every six grains of calomel; but if the action of the heart is still strong, half or a third of that quantity will generally be sufficient to prevent the mercury from irritating the bowels, which is in that case the principal object of the opium. We have generally preferred Dover's powder, or a simple combination with ipecacuanha to the opium alone; for while the anodyne powers of the drug are not impaired, its stimulant quality is thus considerably diminished. In a few instances the sulphate of morphia has been substituted for the opium, and apparently with good effect, but our experience on this point is too limited to enable us to speak with certainty. In less sthenic cases, and especially where there is much gastric derangement, or a fever which assumes more of the idiopathic character, with a dry loaded tongue, hot skin, and vitiated excretions, the calomel is with greater advantage given in more divided doses, and frequently; as from gr. iss. to gr. iii., with two or three grains of Dover's powder every second or third hour. In some instances, particularly where there is an irritative diarrhœa, the hydrargyrum cum cretâ may be advantageously substituted for the calomel, double the quantity being generally given. The remedy, in whichever of these various ways it is given, should be continued until it either produces a decided impression on the disease, or affects the gums. Generally these effects take place simultaneously, and the improvement is seldom permanent and progressive until the influence of the mercury on the system is manifest in the gums. It is a favourable sign when this takes place readily, for the most obstinate and formidable inflammations counteract the specific influence of mercury; and if, after salivation has been produced, the inflammation becomes rekindled, the gums get well, and the breath loses its mercurial fetor. As soon as the mercury has shown decided effects, it may be diminished to two or three moderate doses in the day; but when the disease has advanced to hepatization, it is proper to keep up its influence in a minor degree for some days. Mercurial inunction is sometimes practised to accelerate the introduction of the metal into the system, but this is too slow a process to be of material assistance where so much promptitude is required.

[Opium alone, or in the form of morphia or other of its preparations, the writer has found a most valuable remedy in active pneumonia after bloodletting; and in asthenic cases where bloodletting has not been indicated. In such cases, it must be given in full doses. The objections, urged against its use in this and other inflammatory affections, have been canvassed elsewhere (See Narcotics). To its value in pneumonia other observers have equally deposed. (Christison, *Dispensatory*, p. 684, Edinburgh, 1842. See also, art. *Pneumonia*, in *Encyclopäd. Wörterb. der Medicinisch. Wissensch.* xxvii.712, Berlin, 1842.]

Counter-irritants. — It is generally agreed, among medical writers, that blisters are not admissible in the early stage of pneumonia, and not a few deny their utility altogether in the acute disease. There are two objections against their use: one is, that whilst the inflammatory fever lasts, the stimulus adds to it, and thus reacts injuriously on the inflammation; and the other, in our estimation scarcely less important, that they prevent the use of those means of examination of the chest, which, as we have seen, are necessary to inform us accurately of the state of the pulmonary disease, and of the effect of more powerful remedies upon it. The last objection does not apply to blisters on the legs or some distant part, which are recommended by some physicians even in the early stage. M. Lerminier applies two to the legs immediately after the first bleeding; as soon as they are dry, he repeats them on the thighs, and does not use them on the chest until the disease has taken on a perfectly chronic character. Unless, however, in case of complications with cerebral disease, in which distant revulsion may prove salutary, the effect of this measure is too trivial to be relied on, and the practitioners of this country seldom trust to counter-irritation on any other part than the parietes of the chest, but reserve its application till the active character of the disease has been subdued by other measures. In slight cases they may often be advantageously applied immediately after the first bleeding; but in the severer disease both the objections which we have just stated would deter us from using them until the pulse is soft, and the heat of the skin moderate. Whilst the disease remains acute, blisters from six to ten inches square are to be preferred to smaller ones, as they scarcely irritate more, and their salutary derivative and evacuant effect is much greater. When the disease, after having reached the stage of hepatization, is proceeding towards cure, smaller

blisters, repeated one after another in different parts of the chest, are of considerable utility, and enable the patient to bear a slightly tonic treatment, which is often very salutary at this period. It is at this time only that other means of counter-irritation can well be substituted for blisters. The friction necessary for the application of the tartar-emetic ointment or solution constitutes an objection to its use during the pain, cough, and oppression of the acute stage; but as a safeguard against relapse, and as a means of countervailing the internal irritation and of promoting the sanative process, this method of counter-irritation reaches deeper and is more permanent than repeated blistering. (See COUNTER-IRRITATION.) Rubefacient plasters, as those containing a small proportion only of cantharides, are sometimes sufficient, and produce considerable benefit on the same principle; but they should be of full size, and renewed with sufficient frequency to insure their continued activity.

Evacuants.—We may comprehend, under this title, emetics, purgatives, diuretics, and diaphoretics, all of which are occasionally useful, but it is generally agreed that they are remedies of minor importance, and require some judgment in their application. From the success which has attended the treatment of pneumonia by emetics, in the hands of some physicians, as Stoll, Riverius, Dumangin, Hellis, and Good, we cannot doubt that these remedies are sometimes decidedly useful; and probably they may be so, in the early stage of the disease, by breaking that chain of morbid action by which the incipient congestion becomes converted into inflammatory fever, as well as by their relaxing and derivative effect. They are, however, generally considered as violent and uncertain remedies, and enough of their peculiar effect may be obtained in the ordinary operation of the large doses of tartar-emetic, of which the ulterior action has a higher claim to our confidence.

Much difference of opinion exists as to the employment of purgatives in pneumonia; some practitioners, particularly those of this country, using them freely, not merely to evacuate the bowels, but also as depletories to reduce the action of the heart and arteries. Dr. Pring recommends them with this view, and considers them of equal power with bloodletting in subverting inflammatory action. (Principles of Pathology, p. 208.) The general objection against their use is, that they tend to check the expectoration, which is a natural means of relief to the disease; but probably they are likewise injurious in exciting in the mucous membrane of the alimentary canal an inflammatory state, which gives to the disease that typhoid tendency in which we have recognised one of its most dangerous forms. These considerations deter us from exciting any thing like a continued discharge from the intestines, but we consider that their daily evacuation is a safe and expedient measure, and if this is not effected by the medicines given with another object, it must be excited by a colocynth pill or senna draught, or, where there are signs of gastric excitement, by castor oil or a laxative enema.

Diuretics are indicated chiefly where there is a simultaneous effusion into the pleura; but we have likewise found them useful in combination with tonics in the decline of the disease, to remove the œdema which commonly lingers in the lungs and sometimes affects other parts of the body after the active inflammation has subsided. Nitre, in doses of a scruple or half a drachm in the former case, and the same, or the spirit of nitric ether in the latter, generally answer as well as any other medicine, and their effect is commonly increased by the mercury, digitalis, squill, or other medicines given to fulfil other indications. A diaphoretic operation also often results from the use of the tartar-emetic or calomel and opium when these are given; when they are not, a great heat of skin often renders it expedient to give James's powder, or antimonial or ipecacuanha wine, with a view to determine to the skin; and in children especially, the warm bath sometimes proves useful in the same way; but these remedies are too uncertain and trivial in such a disease as pneumonia to withdraw our principal trust from other more important measures. In some cases, profuse sweats come on, which weaken the patient without relieving the symptoms, and require the exhibition of a mineral acid to restrain them.

Sedatives.—The remedies of this kind which have been held in greatest repute in pneumonia are opium and digitalis. We have already noticed the former in conjunction with calomel, but it is likewise employed alone with a view to quiet vascular action. Dr. Armstrong recommends at least three grains of opium to be given immediately after bleeding to syncope or approaching syncope, and its effect is to preserve the reduction which the loss of blood has already effected in the pulse. This is a point particularly to be observed in the administration of opium. As long as the vascular action is strong, this drug will stimulate and prove injurious; but when reduced by a full depletion, it seems to paralyse those powers of reaction by which, after this temporary reduction, irritation and inflammation are rekindled. We have repeatedly seen the utility of opium in this way; but it has been generally in the first stage of the inflammation; and although we do not hesitate to give it in the full dose recommended, we judge it to be always safer to combine it with calomel and ipecacuanha. Where there is much pain, from twenty to forty minims of the liquor opii sedativus, given immediately after the bleeding, act more speedily and satisfactorily than solid opium. In the after-stages, when the antiphlogistic remedies have reduced, as far as may be, the inflammatory action, opium often proves of the greatest benefit in relieving the cough, which frequently continues troublesome and obstinate, even in the decline of the disease. With this view it is generally combined with expectorants, which we shall presently have occasion to notice. Hyoscyamus, conium, extract of lettuce and of belladonna, are sometimes used with the same intention, and, where opium is ill borne, may prove serviceable; but, although they may at all times be given with less risk, they are generally much inferior to it in efficacy. These medicines, besides reducing the excess of irritability on which the act of coughing depends, seem in some degree likewise to relieve the oppressed state of the breathing, which occasionally remains after the

active disease is subdued, and this they probably effect by diminishing those changes in the blood by which it is rendered venous, and thereby lightening the task of the function of the lungs. (See Dyspnœa. The action of digitalis is considerably different, being principally on the vascular system, and it does not possess any anodyne qualities. It has been much extolled as an aid to bloodletting in reducing inflammatory action; but although it occasionally shows considerable efficacy, its operation is far too uncertain to entitle it to our confidence. Its exhibition is moreover not unattended with danger, for when given largely to affect the pulse, it sometimes develops its effects suddenly in syncope and extreme reduction of the heart's action. We trust to it more in the decline of the disease; and in the dose of ten to twenty minims three times a day, combined with an opiate in an expectorant mixture, we have found it of great use in reducing the pulse and easing the respiration. Some practitioners speak highly of larger doses, frequently repeated, until an impression is produced on the circulation: but we have not seen enough advantage in this plan to induce us to recommend it, and unless watched with the closest attention, we cannot consider it a safe practice. Colchicum may be used with the same intention, but it is more apt to pass off by the bowels, and should therefore be combined with opium. It is most suited to the pneumonia of rheumatic and arthritic subjects, and may be given in the dose of ʒi of the wine with a few grains of carbonated alkali. Hydrocyanic acid does not appear to deserve the encomiums that have been passed upon it, and except to quiet an irritable state of the stomach, we have not seen it useful in pneumonia.

Expectorants.—During the active stage of the inflammation, whilst the pulse is sharp and the skin hot, the secretion of the bronchial membrane is not within the influence of any of those medicines which are called expectorant. The general measures which reduce the inflammatory orgasm of the great pulmonary vessels are then the best means of relaxing those of the bronchi, and this effect may afterwards be kept up by small doses of antimony or ipecacuanha. In an advanced state of the disease, however, the promotion of expectoration becomes an object of great importance, as on its accomplishment may depend the life of the individual. Where the inflammatory symptoms have entirely given place to those of weakness with a great embarrassment of the breathing, the carbonate of ammonia becomes a most valuable remedy, and we have more than once seen it apparently turn the scale in imminent cases. It may be given in doses of five grains or more every hour or every two hours, or more frequently if the sinking state of the patient seem to require it. The decoction of senega is in these cases a good vehicle for it, and great advantage has sometimes resulted from the addition of the tincture of the *lobelia inflata*, which, although an uncertain remedy, often shows great powers in facilitating expectoration and relieving dyspnœa in several advanced forms of pulmonary disease. The first dose of the medicine should not exceed ten minims; but unless it produces sickness, it may be increased by three or four minims in each successive dose. Different individuals bear it very variously: we have known a drachm taken at a dose, with great relief to the breathing, and without inconvenience; in another instance eight minims produced such sickness and giddiness that it became necessary to discontinue its use. When the urgency of the symptoms which indicated the use of ammonia has ceased, it may be of importance to keep up a free secretion from the bronchi, in order to assist in the resolution and dispersion of the solid effusion in the tissue of the lungs, and for this purpose expectorants of less stimulating quality are to be preferred. We have generally found a combination of tincture of squills and ipecacuanha, in the dose of ten minims of each, answer very well; if the cough is troublesome, a few drops of liquor opii sed. or forty or more of the compound camphor tincture should be added. The vehicle for these medicines may be the almond emulsion, with a little liquor ammon. acetat. when the expectoration is thin and scanty; but when it continues viscid, we have found great benefit result from the exhibition of expectorants in an alkaline vehicle, which is the only form in which the alkali treatment, so much extolled by Sarcone and Mascagni, has appeared to us useful in peripneumony. Ten or twenty minims of liquor potassæ, or the same number of grains of carbonated alkali, may be given with the above-named expectorants in water, camphor julep, or any simple vehicle, or in the more asthenic cases, with decoction of senega. In the course of recovery from pneumonia we often find it useful, whilst any pulmonary symptoms remain, to join some expectorant with the tonic that is employed.

[There is no class of remedies more uncertain in their action than expectorants, and certainly none that require more caution as regards their administration in pneumonia. Let it be borne in mind, that there is no article in the Materia Medica, which is an expectorant under all circumstances. Expectorants are altogether indirect agents; hence we find an expectorant effect equally from depletives and from tonics and excitants; from narcotics and from counter-irritants; from nauseants and from emetics. (See Expectorants.)]

Tonics and stimulants.—In ordinary pneumonia this class of medicines is out of the question as long as any signs of active inflammation remain. When, however, depletions do no further good, and the pulse is weak, the skin cool, and the expectoration no longer rusty and tenacious, then, although some dyspnœa and cough still remain, considerable benefit is sometimes derived from the exhibition of a mild vegetable tonic, such as the decoction of senega, or a weak infusion of calumba. We have already named the first of these as a vehicle for carbonate of ammonia to promote expectoration, but it seems also to prove useful from its slightly tonic property, and as a stimulant to the absorbent system. In the state which we have just described, we have often seen the symptoms remaining stationary, without tendency to improvement, until this medicine was given, and then in a few hours the pulse has become slower, the breathing more free, the tongue cleaner, and the strength somewhat improved.

By auscultation, also, we have found in a returning crepitant rhonchus or other vesicular sound, a proof of the impulse which this treatment gives to the absorption of the effused matter. When the active stage of the inflammation has been subdued by tartar-emetic, it is a good plan to continue to give it three or four times a-day in this decoction, as there is nothing inconsistent in the action of the two medicines. After the mercurial treatment it is even more useful, and may generally be given soon after the gums are decidedly affected. The infusion of calumba we have thought better adapted to cases in which there had been much accompanying gastric disorder, and in these it has sometimes cleansed the tongue, which had continued foul in spite of the prevalence of mercurial action in the system. In the exhibition of either of these tonics, however, a close attention must be paid to prevent the re-kindling of the inflammatory disease, and they must be discontinued on the appearance of any sign of reaction. They are most safely employed in conjunction with an external counter-irritation on the chest; and it is under these combined measures that the most rapid recoveries take place. In the more typhoid forms of the disease, especially those complicated with adynamic fever from the beginning, tonics and even stimulants are required more frequently, and with less limitation. In some of these cases, where bloodletting is not borne, bark and camphor may be given even in the early stages of the disease, for the pneumonic affection is really more a passive congestion arising from an extremely atonic state of the vascular system, with probably an altered state of the blood, than a true inflammation. Laennec says that he has, with success, given both bark and wine in certain epidemic peripneumonies, particularly in one which prevailed among the troops in 1814. He also recommends these to be administered towards the termination of the disease in old persons, and in debilitated and cachectic subjects, when, after the suppurative stage, the fever passes off and resolution goes on very slowly. He considers cinchona the best remedy in gangrene of the lungs, even when there is extensive hepatization around the eschar; but to be effectual it must be given to the extent of an ounce of the powder daily, or an equivalent portion of sulphate of quinine. Except in case of complication with intermittent fever, where the specific operation of bark is required, we are disposed to trust at first to opium, camphor, and ammonia, in the typhoid pneumonia, combining them with calomel, and to resort to the bark only if the general strength seems to require it afterwards.

Application of the Treatment.—We have only to point out here the manner in which the several remedies which we have described may be combined in the treatment of individual cases. Where the case is at all severe, the treatment with tartar-emetic, or with calomel and opium, should be commenced immediately after the first bleeding, and continued uninterruptedly until an impression shall have been produced on the disease. It is not safe, however, with either of these remedies to lay aside bloodletting; if sensible relief does not ensue in the course of five or six hours after the first full bleeding, this measure must be repeated as before recommended. In the most acute and inflammatory cases, uncomplicated with gastric disease, we have sometimes combined the mercurial with the antimonial treatment, by giving a pill containing from six to ten grains of calomel, with from half a grain to a grain and a half of opium every four or six hours, and the tarter-emetic draught before prescribed, in the middle of that interval; and where the tolerance is established soon, the effect of this treatment is very powerful. If the bowels are too much acted on, the hydrargyrum cum cretâ in double quantity may be substituted for the calomel. When an amelioration takes place in the symptoms, the mercury may be omitted, and the case left to the tartar-emetic, and whatever depletion or counter-irritation may be required. If the attack of pneumonia is very recent, and accompanied with a sharp stitch in the side, or catch in the breathing, a full dose of opium immediately after a large bleeding, as recommended by Dr. Armstrong, will sometimes be found sufficient to cut short the disease. This plan can only be adopted where the bleeding has been so copious as to produce a great and real impression on the heart's action, almost, if not quite, amounting to syncope. The dose of opium should be large; three or four grains of the aqueous extract, or if the pain and tendency to reaction are urgent, from 30 to 60 minims of the liquor opii sed., are the preparations to which we give the preference. Even in this case we think it advisable to give from six to twelve grains of calomel, or from ten to twenty grains of blue pill, with, or soon after, the opium; the mercury does not interfere with the sedative operation of the latter, and by preserving the balance of the secretions, it prevents those functional derangements which sometimes follow the use of opium even in this way. If the disease has in any degree passed into the second stage, and even if the first has lasted more than twenty-four hours, there can be little hope of stifling it with opium, and we must then resort to the alterative powers of tartar-emetic or mercury, with whatever bloodletting the case may bear. Blisters can seldom with advantage be resorted to, until all fulness and hardness of the pulse and heat of skin have subsided; and either these symptoms, or even the continuance of a fixed pain, would counter-indicate the use of the decoction of senega, or any of the mild tonics which prove useful in the decline of the inflammation.

If, from the copious expectoration of pus and the physical signs of a cavity in the lungs, it is probable that an abscess has been formed, it may be necessary to support the strength by a stronger tonic, as the sulphate of quinine or bark with a mineral acid; but the expediency of this must depend on a complete predominance of the symptoms of weakness over those of inflammation. In case of gangrene, some of the medicines of a supposed antiseptic power may be given. Drs. Graves and Stokes, in a case of this kind, gave the chloride of lime in the dose of three grains with one of opium three times a-day, with the effect of removing the fetor from the expectoration, and for a time improving the symptoms. We have seen the same medicine in solution apparently produce

the same result; but we cannot expect much from the operation of such agents. The principal object in case of gangrene is to support the general strength, and counteract the noxious influence of the dead matter, until it can be thrown off from the system.

The great fatality of pneumonia among children renders it necessary that its treatment should be directed with the greatest care and promptitude. This fatality does not arise so much from the course of the inflammation, as we have seen that this is less rapid than in adults; but from the latency of the local symptoms, and the tendency of the disease, under this disguised form, to pass the period in which bloodletting is most effectual. Hence, many of the cases of infantile pneumonia which we have to treat, especially in the lower classes, are already in a sinking state; the depressing influence of the injured function of the lungs, which at this age ill bears any abridgment, having already removed the sthenic character of the disease. This circumstance represents to the mind the importance of physical examination of the chest in all the febrile diseases of children, in order that, if any crepitant rhonchus be discovered, the fit remedies may be promptly applied. In this early stage bloodletting is highly efficacious, but when used after the disease has lasted for several days, it sometimes produces convulsions and sinking, without relieving the respiration. The same observation may in some degree be applied to tartar-emetic, and yet these are the most effectual remedies which we possess for infantile pneumonia, and if used together at the commencement, seldom fail to subdue it. Mercury with difficulty produces its specific action on infants, but it is still of great effect as a purgative; and when bloodletting is no longer borne, calomel, in doses of half a grain up to two grains, according to the age of the child, every hour or second hour, is the remedy on which we have principally to depend. Unless where there is an irritative diarrhœa, opium can seldom be used with advantage; in that excepted case, Dover's powder is the best form. Although mucous or bloody stools imply an undue irritation from the calomel, and ought to be checked, yet copious evacuations of green bile are essential to the success of its operation, and seldom produce in the pneumonia of children the bad effects which result from purgation in the adult. It would seem that expectoration, as it is a less natural process in early life, so its importance as a vicarious discharge is of inferior moment, and does not prohibit purgatives and other measures that may arrest it. Counter-irritation with tartar-emetic ointment or solution is of great efficacy in the after stages of pulmonary inflammation in children, and should especially be persevered in where there is any sign of a phthisical tendency. This, together with a sedative linctus to quiet the cough, and a light tonic if required, constitute the chief part of the treatment most eligible in the decline of the disease.

In aged persons the disease is often very intractable, in consequence of the great debility which accompanies it. The mere circumstance of age should not, however, restrain us from the use of the lancet, where the state of the breathing and pulse, and heat of skin seem to indicate it. Frank bled an octogenarian pneumonic patient nine times with a happy effect. It must be confessed, however, that the period in which bleeding is useful in old people is short, and the frequent complication of a pituitous catarrh with pneumonia still further restricts its utility. Expectoration is in these cases a most important process, and when bleeding weakens so much as to be likely to interfere with the performance of this act, it must be abandoned. In some cases cupping may be substituted, but blisters of ample size are more effectual, and may be employed much earlier than in younger subjects. The internal remedies may be administered as usual, but it is often necessary to resort soon to the tonics and stimulants before described.

We know of no reason why the sex of the subject should materially modify the treatment of pneumonia. The presence of the catamenia ought never, in cases of any severity, to interfere with free depletory measures, for the influence of this relief on the system is trifling, compared with the progress of a dangerous inflammation. The case may be different in slight examples and towards the decline of the disease, and stimulating pediluvia may be used, if the circumstances indicate it, to promote a natural crisis of this sort.

The complications of pneumonia with other diseases will require that the treatment should in some measure combine the indications of these various affections. Thus in the complication with bronchitis the power of bloodletting will be more contracted, whilst the antimonial treatment of blistering will claim more confidence. In pleuropneumonia, local bleeding, in addition to venesection, becomes a very useful remedy, and if the pleuritic affection be extensive, or accompanied by much pain, calomel and opium will form the most eligible remedy. In the treatment of pneumonia occurring in continued fever, [and in all forms of typhoid pneumonia,] the probable duration of the latter affection must be held in view, and depletions practised in a more cautious manner. The mercurial treatment is generally the best here likewise, especially if the fever partakes much of the gastritic character; and the hydrarg. cum cretâ, with ipecacuanha or Dover's powder, is the preferable preparation. When any of these fevers take on the typhoid or adynamic form, stimulants and tonics will sometimes be required, and must be given, notwithstanding the pulmonary disease. It must be confessed that medicine has often very little power in these cases; but as far as our experience goes, stimulants judiciously given when the heart's action is very feeble, and the muscular powers are very low, have appeared to relieve the pulmonary affection, as well as for a time to restore a portion of strength; and it is only by overstimulating the heart that there is a risk of aggravating the inflammatory disorder. They must therefore be carefully watched, and diminished or withdrawn as soon as any sharpness or hardness is perceptible in the pulse. Besides those before enumerated, we may mention musk, which is highly recommended in the typhoid form of pneumonia by M. Recamier, who gives it in doses of from 24 to 30 grains, with an effect which he considers almost specific. It seems to us ques

tionable, whether the affections which have been called intermittent peripneumonies, and said to have been cured by bark, are really inflammations: it is more probable that they consist in a simple congestion of the lung, determined by the febrile paroxysms, just as simple congestions are more familiarly known to take place in the spleen, liver, &c.; and from the near pathological affinity between the two, it is not surprising that such a congestive state should produce many of the local phenomena of pneumonia. Although there can be no doubt of the power of bark and arsenic over these intermittent diseases, yet even here the oppression of the affected organ during the paroxysm is occasionally such as to require the aid of bloodletting. Neither should this measure be withheld, from fear of suppressing the eruption, in the pulmonic affections coming on at the commencement of the exanthemata: the internal affection is a present and dangerous evil, not to be neglected on account of other imaginary ones.

In the peripneumonies supervening on hooping-cough and influenza, it is sometimes a chief indication to give sedatives to allay the cough, which appears often to have a considerable share in producing the parenchymatous inflammation. Besides bleeding, therefore, to the extent that the case may require, large doses of the tincture of hyoscyamus (℥ss, and upwards, or, in hooping-cough, the extract of belladonna, in doses of half a grain to the adult, and one-sixteenth to children below two years, these being gradually increased) will be found of much efficacy in counteracting the inflammatory tendency of these affections. Local depletions and counter-irritation will generally be sufficient to arrest the inflammations intercurrent on phthisis; and we have found the tincture of digitalis very useful in these cases. Where an inflammatory state of the mucous or serous membranes of the alimentary canal accompanies pneumonia, it is of great moment that the treatment should extend to these complications, for they greatly aggravate the case, and render it less tractable. Free leeching of the abdomen must be included in the depletory measures, and the hydrargyrum cum cretâ, with Dover's powder, will be the best antiphlogistic alterative. Purgatives must be at first rigidly proscribed, and the bowels merely evacuated by laxative enemata or suppositories. In the progress of recovery, a teaspoonful of castor oil daily, and infusion of calumba with dilute nitric acid, or some such light tonic, will often contribute greatly to restore the healthy functions of the membrane.

Diet and Regimen.—No one can question the propriety of a strictly antiphlogistic regimen in ordinary cases of pneumonia. A total abstinence from all solids must be enjoined during the inflammatory stages of the disease, and the liquids taken should be of the mild mucilaginous kind, such as barley-water, tea, lemon-peel, and other simple vegetable infusions. It is generally recommended to give these beverages warm: but unless large draughts are taken, we see no objection to their being given cold if the patient prefers it. We have heard Professor Hamilton of Edinburgh express his decided belief that liquids are injurious in pneumonia by adding to the mass of blood, and thus counteracting a principal good effect of bleeding; and so far does he carry this opinion, that he considers that even pediluvia may do harm by throwing more liquid into the system through the absorbents. Although a zealous advocate for a dry diet in some other complaints, the writer is not persuaded of its utility in the present disease, except in cases where the dyspnœa is urgent. In such cases we have seen the breathing distinctly become worse after copious draughts of liquid, and with a view to keep the mass of blood which passes through the lungs as rich in quality and as small in quantity as possible, a paucity of drink may here be reasonably recommended. The antimonial treatment generally requires a certain degree of abstinence from liquids; for until the tolerance is completely established, a large draught is almost sure to produce vomiting. M. Chomel has pointed out a very important exception to the utility of an absolutely antiphlogistic regimen, in the case of those addicted to excess in wine or spirits. The great fatality of pneumonia in these subjects when treated in the usual way is well known; and observing that one man accustomed to such excess, who continued to take a pint and a half of wine daily throughout his illness, speedily recovered from the disease after only one bleeding, M. Chomel afterwards prescribed a certain quantity of wine in similar instances, and with a success that encouraged him strongly to recommend the practice. These may probably be included in the class of malignant cases, in which Laennec says that both wine and bark are beneficial. After the active stage of inflammation has been subdued, the moderate return to nourishing food, as the appetite craves it, is desirable. It should, however, be confined at first to farinaceous liquids, light puddings, and the weakest chicken or veal broth; these may be gradually improved in nutriment, and in the course of a few days a little white fish may be allowed; and the return to ordinary animal food made by degrees and with circumspection. In case of gangrene or extensive suppuration, as manifested by fetid or copious purulent expectoration, with great prostration of strength, a more nutritive diet, such as beef-tea and animal jellies, will be required; and these are cases in which wine may sometimes be cautiously administered; but too much attention cannot be paid to watch lest this regimen should re-excite an active state of inflammation.

In the progress of convalescence from pneumonia, we may say of nutritious food what we have remarked of tonics, that it must be watched in its effects, and that its tendency to rekindle the local disease may be safely restrained by the simultaneous use of counter-irritation on the chest.

Patients labouring under peripneumony should be kept in an airy room of moderate temperature, (about 60°,) being protected on the one hand from an accumulation of heated or impure air, and on the other from draughts of cold air. These points require the physician's attention, and are too important to be left to the sole discretion of the attendants. Much covering can seldom be borne, and it is therefore the more necessary to guard against the effects of accidental cold; whilst the oppressed state of the breathing still requires that the air should not be close or impure. It is

of some importance likewise, in the severer cases of inflammation of the lungs, that the chest should be raised above the level of the lower part of the body. The best method of doing this is by a bed chair, which by means of a notched rack can be raised to different angles with the level of the bed; but the same object may in a measure be attained by propping the back with pillows. This posture, besides that it facilitates the breathing and expectoration, prevents the gravitation of the blood to the lungs; and from the close connection which we have frequently noticed between the mechanical and the active hyperæmia of the lung, the importance of this last point is obvious. The exertion of the lungs required in talking is injurious, and must be avoided, and the bodily efforts should be confined to necessary acts. Muscular movement hurries the circulation, and that which does this in the disabled state of the lungs necessarily causes that injurious congestion in the organ which we have so frequently noticed in its connection with inflammation.

In enumerating the causes of pneumonia, we had to remark that nothing so strongly predisposes to the disease as its previous occurrence in the individual. Hence *prophylactic measures* become of great importance, and the more so in proportion as the attack has been frequently repeated. The necessity is obvious in such cases, of protection from the various exciting causes, by warm clothing, by avoiding exposure, exertions of the voice, and violent exercise of any kind, by abstaining from excess in diet, and by living on that quantity and quality of food which support the strength without inducing depletion, and by such diet and regulated exercise, or if necessary by proper medicines, ensuring the due performance of the secretory functions. Among the most essential articles of warm clothing, we may mention a flannel waistcoat next the skin, and during the prevalence of cold weather, a wash-leather vest over it: these will be found more effectual and less cumbersome than a larger quantity of outer clothing, and should never be neglected by the pulmonary invalid. We cannot inveigh too strongly against the pernicious practice of females liable to pulmonary inflammations subjecting themselves with their necks and chests bare to the trying changes of temperature inseparably attendant on evening visiting. In cases where, in spite of all precautions, the complaint recurs repeatedly at every return of cold weather, and renders the individual a constant invalid, a change of residence during the winter and spring months to a more genial climate becomes a desirable measure. Torquay and the Undercliff of the Isle of Wight in our own country, and the south-west of France, the coast of Egypt and Barbary, Madeira, and some of the West India Islands may be named as generally the most eligible places of resort; but the circumstances of the individual case must in great measure determine the choice. (See Climate.) The most efficacious remedial measures which we know of to counteract this tendency to the reproduction of pectoral inflammation, is a continued counter-irritation, by means of tartar-emetic, or a seton or issue, on the chest. We give the preference to the former; and we have seen patients under its influence regain a degree of robustness and hardiness which they had not known for months. When this measure seems to be no longer necessary, the mild irritation of a pitch plaster may be substituted. Those persons in whom there is only a proclivity without any symptoms of real disease, should habituate the pulmonary circulation to regulated impressions of cold and healthy reaction, by sponging the chest with vinegar or salt water, at first tepid, and afterwards cold, and using vigorous friction with a rough towel afterwards.

V. Chronic Peripneumony.

Laennec commences a section under this head, with a question as to the existence of such a disease; and although he adduces a few examples, which he admits to be of chronic inflammation, he views it as "hardly probable that an organ so vascular, so mobile, and so essentially living as the lungs, can remain long in such a state of slow and inactive inflammation, as we know to be the condition of organs less necessary to life." (De l'Auscult. Méd. t. i. p. 475.) But this argument is hardly tenable on a comparison with other organs equally vascular, and is inconsistent with the existence of chronic pneumonia to the extent in which he admits its existence. The form of disease considered by him to be chronic peripneumony is a hard compact kind of hepatization, sometimes found around gangrenous excavations and hæmoptoic engorgements, and very rarely also around tubercular cavities and between tubercles. The lung thus affected creaks when cut, is more livid or grey than ordinary hepatization, and presents a more distinctly granular form, so that it resembles the eggs of certain insects closely pressed together, without any intervening substance. This may reasonably be considered the chronic form of granular hepatization. But as we have found the acute disease occasion a consolidation of the lung without the appearance of granules, so it may be reasonable to expect that the chronic inflammation may present us with a corresponding uniform kind of induration. Accordingly, we find Andral, Chomel, and Louis, describing other non-granular forms of chronic solidification. It is sometimes found of a bright red or a buff colour, but more frequently it is livid or grey, being variously modified by the quantity of blood and the black pulmonary matter in it. It exudes little or no fluid when pressed, and is quite solid, sometimes approaching to cartilage in density. The red kind is most commonly a sequel of the acute disease imperfectly cured; the grey kind is more frequently found in the lungs of phthisical subjects with miliary tubercles scattered through it or surrounding tubercular vomicæ. The resemblance between the substance of this miliary tubercle and this grey uniform induration, and the circumstance that yellow tubercular matter is frequently found in the tissue thus indurated, led Laennec to the belief that this induration was only a diffused form of the same accidental tissue which he called a first stage of tubercle. The resemblance is certainly very strong, and as we often see an indurated hypertrophy of the interlobular septa, (See Dr. Hope's coloured illustrations, figs. 3 and 5,) so a close inspection will generally detect that the solid

state of the lung is owing to the same deposition in the interstitial tissue of a matter more or less dense, which we know in other parts to follow chronic inflammation. As far as it is connected with phthisical disease, this matter will be fully treated of under the head Tubercular Phthisis; but we cannot refrain from repeating the opinion (which is nearly that of Andral also,) that the miliary and diffused indurations considered by Laennec as the first stage of tubercle, are the effect of chronic inflammation of the interstitial tissues of the lung. The length to which this article has extended prevents us from entering on the question of the relation of inflammatory to consumptive disease; but we cannot refrain from expressing our belief, that if tubercle is not generally produced by chronic inflammation terminating in an irregular form of suppuration, extended pathological research proves more and more that an absolute line of demarcation cannot be drawn between the indubitable result of inflammation, and the various forms of what is now called tubercle.

We have just adverted to the resemblance between the texture of miliary granulations and certain forms of chronic inflammation; and those familiar with pathological anatomy will acknowledge that there is no constant line of distinction between purulent and tubercular matter; and that, although they are generally different, yet cases frequently present themselves in which they so completely pass into each other that no physical characters appropriate them to either kind of lesion. That tubercle may sometimes be developed without any inflammatory process, is sufficiently proved by the examples in which it occurs in various parts of the body at once, apparently as a modification of the ordinary nutritive secretion of the part under the influence of a peculiar diathesis; but the prevalence of this diathesis in a lower degree, although insufficient in itself to produce tubercle, may give a tuberculous character to the products of any inflammation that may arise, and this the more effectually as the inflammation is asthenic and defective in the energy of its orgasm. Although we thus express our conviction of the connection of this subject with that of pulmonary consumption, we must not entrench on the article devoted to that disease, and we will close these remarks by quoting from the little work before noticed the conclusions to which we were then led, as they develop what we consider still to be the full extent of the relations of inflammatory to tubercular disease. "The lungs may become infested with tubercular matter:—1. by the tubercular suppuration of the indurations, whether granular or diffused, which we have been induced to consider chronic inflammations of the pulmonary tissue, this being the natural termination of such inflammation: 2. by tubercular suppuration of other inflammations of the tissue; this effect being determined by the prevalence of the tuberculous diathesis:* 3. by secretion in tissue bearing no marks of other lesion, the tubercular matter being here deposited through excess of the tuberculous diathesis," modifying the common nutritive secretion of the part. (Rational Exposition, &c. p. 160.)

The symptoms of chronic pneumonia supervening on an acute attack partake of the general character of this modification of inflammation. Thus, although the general fever abates, and the functions are in some degree restored, yet the pulse is still quick, the breathing short, the cough remains, the expectoration often assumes the characters of that of chronic bronchitis, and the patient, although he recovers in some degree his appetite and strength, looks ill, and does not advance beyond a certain degree of amendment. Percussion and auscultation will discover the remaining disease by the dull resonance of the corresponding part of the chest, and the absence or bronchial character of the respiratory sound. The solid state of the lung which causes these signs, if it be not removed by the sanative processes of nature aided by remedies, will gradually induce other disorders: either it may terminate in suppuration, and, if extensive, it will endanger life by the unmanageable decay in which it involves the lung, and which, if not identical with tubercular disease, bears to it a strong resemblance in its symptoms and course; or remaining a solid obstruction to the circulation and respiration, it occasions dropsy and that cachectic state which we find induced by chronic pleurisy, pulmonary emphysema and other local diseases which permanently infringe on these vital functions; and here again a condition is produced which is on all sides admitted to be most favourable for the development of genuine tubercular consumption. In fact, however we study the relations of inflammation and tubercle, whether rationally or from evidence, whether at the bedside or in the dissecting-room, we are continually meeting with proofs of proximity between them, which are far too constant and regular to be ascribed to accident. Were we to describe the symptoms of pneumonia originally chronic, we should only have to state phenomena which are detailed in another article. See Tubercular Phthisis.

Treatment of Chronic Peripneumony.—If this disease is so exceedingly rare as it is supposed by Laennec to be, we might pass over the subject of the treatment entirely, as he does; and if, as we believe, it constitutes a form of consumptive disease, we must refer to the article on Tubercular Phthisis for its fuller consideration. We would, however, make one remark to reconcile views which may otherwise appear conflicting; that because tuberculous disease may be developed and hastened by a form of inflammation, it does not follow that consumption is to be treated by depletions and abstinence. We have often seen that these measures do not restrain the asthenic and chronic forms of inflammation, while they may injure the general power of the constitution, and that the combination of treatment most useful in these cases is a mild tonic and nutritive regimen, with external counter-irritation and whatever alterative the case may suggest. We believe these to be the most successful measures in the disease in question, which may in addition require expectorant and other remedies for particular symptoms, and the removal of the occasional causes by resorting to another climate. We have

* See *Dr. Alison*, on the Origin of Tuberculous Disease, Trans. of the Medico-Chir. Soc. Edin. vols. i. and ii.

known a case of chronic solidification of the lung, which had already begun to exhibit the commencement of a phthisical career, cured under a course of iodine internally, with external counter-irritation, and careful protection from transitions of temperature. The prospect of a cure will be in proportion as the disease is limited in extent, and the constitution strong and free from that diathesis which we have noticed as the cause of the worst form of consumptive disease.

C. J. B. Williams.

PNEUMOTHORAX. — This term (compounded of *πνευμα, ατος—θωρηξ,*) signifies a collection of aëriform fluid in the cavity of the pleura. As such a pathological state had not attracted notice till modern times, it remained undistinguished by any proper appellation till the beginning of the present century, when the word pneumothorax, invented by M. Itard, was adopted to designate it. It has been objected at various times to this term that its etymological composition is incorrectly formed, but closer examination into the analogies of Greek derivatives proves this to be unfounded; and, moreover, it appears now to be so well established on the basis of authority and general adoption, that any change would be both improper and impracticable.*

Gaseous collections have been frequently noted as occurring in some of the serous cavities as well as the other tissues of the body. It had been often observed that air escaped on opening the thorax in necroscopic examinations, and the attention of surgeons was occasionally arrested, during the operation for empyema, by a rush of air through the canula preceding the flow of matter. The effusion of air consequent on laceration of the lung by fractured ribs was known, but was classed with emphysema, and called *emphysema thoracis*. Those casual observations had not been reduced to any digested form, nor did they lead to investigation of the true origin of the elastic fluid, as it was universally assumed that the latter was extricated by decomposition from the purulent matter. It was not, therefore, till 1803, when M. Itard published his dissertation, that air in the pleura came to be considered as not a mere accidental complication in some rare cases of empyema, or as only occurring after death, but to constitute in itself an important pathological condition. Although thus much appears to have been established by the researches of this author, the insufficient advances which morbid anatomy had made, and the incorrect notions which prevailed as to the pathology of thoracic diseases, prevented him from going much further. His views corresponded with the old crude idea of the chemical decomposition of pus. He regarded it as always consequent to and depending on a latent phthisis, and ascribed the production of the air to the decay of the lung by means of a chronic suppuration, and the long retention of the pus in a shut cavity, which caused a partial absorption of the stagnant liquid, and its decomposition into an aëriform fluid: this was the state of knowledge on the subject till the time of Laennec, for whose labours it was reserved to investigate its true nature, and to give it its proper place in nosology. His researches have attached to pneumothorax the highest degree of importance, and we do not think that the genius and industry of this great physician have been more signally displayed in any of their achievements for thoracic diseases, than in the comprehensive illustration which he has given of the pathology and diagnosis of this affection.

Two sources are recounted by which air in the cavity of the pleura may originate. It has been said to be generated within that membrane, and it may be introduced from without. The former, we have seen, is the origin to which M. Itard ascribes it in every case, and Laennec assents to this manner of explaining the six cases which he cites. In all these instances the pneumothorax was accompanied by a pleuritic effusion, the consequence, as they relate, of phthisis; and the latter author is of opinion that the gaseous development was caused by a decomposition of part of the albuminous matter suspended in the puriform effusion. This, he adds, is rendered probable by the odour of sulphuretted hydrogen which the air exhaled. Neither this nor any of the other circumstances by which they were attended would incline observers at the present day, furnished with precise and more extended information on the subject, to agree to this method of explaining it. On the contrary, the examination of their details exhibits sufficient evidence to authorize us in referring them to a cause (the admission of air from without) which will be hereafter mentioned, as by far the most frequent of all. It has never been satisfactorily proved, and it seems to us an extremely problematical circumstance, that pneumothorax ever occurs by the putrefactive decomposition of a pleuritic effusion. The other processes by which air may be developed within the pleura, as recounted by Laennec, will be afterwards adverted to. It may be here stated that some of them are only conjectural; for the experience of one individual could not supply well-ascertained facts sufficient to establish by observation all its causes and their relative frequency, particularly as he had to bring to maturity his own discovery of the method of exploring them.

* We find that Dr. Elliotson, in his lectures, has reproduced the objection of Piorry to the term pneumothorax (Lancet, 1 Dec. 1832, p. 305.) He states that these compounds are always made from the dative singular, and that the word should be *pneumatothorax*. With unfeigned deference we would submit that the majority of these compounds are not formed from the prolonged dative, as *αἱματι, ὑδατι*, but from the nominative *αἱμα, ὑδωρ*, by changing its termination into *ο*,—for example, hemorrhage, hydrothorax, &c. Pneumothorax, formed according to this analogy, is a more perfect hellenism, and (as will be easily conceded) much more euphonious than the other formation. Its true signification also is "air in the thorax," and not "lung in the thorax;" for it will be observed that if this were necessarily its meaning, it would follow, by the same analogy, that hydrothorax signifies, not "water in the chest," but "hydra in the chest," and to represent the former it should be *hydatothorax*. Professor Elliotson has permitted himself to overlook his own principles in saying that pneumothorax means "lung in the thorax," for even if, as he insists, the formation from the dative were followed (as we acknowledge it has been in a *few* instances), it is immediately apparent that "lung in the thorax" would be *pneumonothorax, μνευμων*, pulmo, *ονος, ονι*. In arranging the terminations of these compounds the ancient Greeks paid especial regard to the euphony, but this does not seem to have been the case with their successors who lived at the decline of the language, for to these are certainly to be referred the few compounds in *ato*, as hæmatocele, pneumatocele. The last word was even changed from the original pneumocele: vide Laennec, de l'Auscultation, tom. ii. p. 241, note. Edition 1826.

It may be laid down as proved by the recorded experience of medical men, that where pneumothorax exists the air has been introduced from without; for cases of an opposite description are so rare that they must be considered as exceptions to the rule. This position will not be called in question, we apprehend, by any one who has devoted some attention to this subject. Air, then, may enter the serous membrane and form a lodgment in the sac of the pleura, either from the lung and bronchial tubes, or by the thoracic parietes through the skin and intercostal spaces. An example of the former is afforded by the rupture of the pleura from the bursting of a tubercular cavity communicating with the bronchial tubes, and of the latter by the opening of an anthrax of the intercostal spaces through the costal pleura, or by the pneumothorax consequent on penetrating wounds of the chest, whether accidental or artificial. We proceed now to expose the phenomena of this affection; but as most of these are common to it from whatever source it arises, it will be found advantageous to consider them in a description of it as resulting from one particular cause; namely, the first which we shall mention.

Pneumothorax produced by the bursting of a tubercular abscess into the pleura.—This species of the affection is, beyond all comparison, more frequent than all others. If we were to conclude from the experience of the medical men in Dublin who have given most attention to the subject, it might be asserted that it constitutes fully nine-tenths of the cases of pneumothorax, with the exception of the traumatic variety; and this, or even a greater proportion, is established by the cases found in medical writings since the publication of Laennec's work. This great comparative frequency, together with the importance which it derives from its connection with the history of phthisis, have concentrated upon this form nearly the whole interest which the malady possesses.

Pathology.—The cavities which the progressive stages of aggregation and softening of tubercles form in phthisis are situated almost invariably in the superior lobe of the lung, and it is at the very summit of this that in general the excavation is largest. While the pulmonary parenchyma disappears before the expanding walls of the abscess, a remarkable circumstance is observed in examining the manner in which this tissue is destroyed, which shows that nature was making at least some struggle against her too powerful enemy. It is found that the bloodvessels are not engaged in the ulceration, but become obliterated, and traverse the empty cavity as solid chords. The bronchial tubes, on the contrary, are involved in the destruction, and their divided ends preserved open, levelled to the surface of the parietes of the sac, and forming a part of them. This double provision has obviously for its ultimate end to prevent sudden hemorrhage, and to allow of the evacuation of the tubercular matter. (See Phthisis.) While the latter is accomplished, it is manifest that the same passage which permits the matter to escape admits the inspired air to fill the space which it occupied. If life be prolonged, the parietes are always enlarging their limits, and thus, although slowly, marching towards the surface of the lung. Those centrally situated do not often arrive at the surface, but others, originally developed more superficially, extend in their progress to the serous membrane, which at length becomes in contact with the membrane forming the wall of the cavity. Here the spreading further is generally restrained by the throwing out of lymph and the formation of adhesions, but not uniformly, for in many instances the pleura is perforated. The immediate consequence of this is that the contents of the tubercular abscess, including softened tubercle, muco-purulent matter, and air, are precipitated into the cavity of the pleura. The reception of these contents into the pleura could not take place if the lung were to remain as in its natural state, in perfect apposition with the costal parietes, but a new condition is induced on the occurrence of perforation which permits it. In the physiological condition the lung is retained in a state of distention beyond its mean capacity by the expansion of the thorax, a condition which its highly elastic structure allows. It is, even at the extremest expiration, we believe, still kept more expanded than its elasticity would allow if left to itself, and not counteracted by the atmospheric pressure. The latter force, however, certainly stretches it during inspiration, when the capacity of the thorax is much enlarged; but when perforation of the pulmonary pleura takes place, the pressure becomes equalized on the external and internal surfaces of the lung, and now the elasticity is permitted to act, which it immediately does by producing the recession of the lung from the costal pleura. By this means a space is left and instantly filled with air from the bronchial tubes, which have now, by the intervention of the phthisical cavity, a free communication with the sac of the perforated pleura. Such is the mechanism by which the atmospheric air gets ingress in this variety of pneumothorax.*

To physicians who have opened many subjects that have died of phthisis, it would at first only seem a surprising circumstance that pneumothorax is not a more frequent occurrence. They are accustomed to find very frequently at the summit of the lung phthisical cavities, bounded merely by the pleura itself, or with so thin a plate of lung interposed that it is scarcely any protection to it. Yet it is well ascertained that perforation rarely or ever takes place at the summit, where we so frequently meet with so slender a barrier to prevent it. The explanation of this is found in the fact that the summit of the lung in which large cavities exist is always covered by a dense cap of false membrane, which effects its firm adhesion with the opposed costal pleura. It would seem that, as

* It will be observed that we have adopted Dr. Carson's views with respect to the agency of the elasticity of the lung in respiration. We think that, so far as we have stated them, they are consistent with our experimental knowledge on the subject, but we are not ignorant that many think them contradicted by the phenomena of wounds of the chest, where *hernia* of the lung succeeds. It is almost certain that the latter is caused by a vital irritability, and not by mere elasticity, as we see that the invariable action of the latter in the dead subject is to contract the lung when the internal pressure is removed. The forces which act on the lung are by no means sufficiently investigated; the experiments which have been made on the eighth pair seem quite inconclusive on this subject, and until it be further elucidated, many phenomena connected with asthma, hysteria, protrusion of the lung, and its re-expansion after collapse, must remain unexplained.

the parietes of the cavity approach the surface at the summit of the lung, an effort of nature is made to intercept the escape of the contents of the tubercular cavity, by the formation of these adhesions. A chronic inflammatory action in the pulmonary tissue always surrounds the cavity for a lesser or greater extent, and, as it were, precedes its progress towards the surface. The effect of this is visible in the plates of lung often found to intervene between the cavity and the surface, which are generally in a state of dark-grey hepatization. It is by this same inflammation that the false membranes are thrown out which effect the adhesion of the pleural surfaces,—those, we mean, which are met with covering the summit of the lung in phthisical patients. It is found that in the same proportion as the cavity advances to the summit, the cap of false membrane becomes more strongly organized and thicker, and forms thus an effectual protection against perforation as far as those adhesions extend.

It is important to remark, with respect to those dense membranous cases, that as it is in the summit of the lung that cavities usually exist, so this part is much more favourably circumstanced for adhesion than any lower part; for the sliding motion of the lung on the costal pleura is greatest at the diaphragm, and diminishes in proportion as we ascend to the summit, where it is little if at all moved by the respiratory action. A constantly quiescent apposition of the two surfaces is that which most advantageously promotes the formation of adhesions, and, as we have just stated, this is possessed only by the summit, and decreases as we descend from this. These considerations explain the observation, well known to all conversant with phthisical dissections, of the existence of the membranous coverings at the summit of the lung. They moreover show the reason, that while it is in this place tubercular cavities generally first attain the surface, perforation of the pleura most seldom occurs here, and they also lead us to anticipate the fact that the perforation *does* generally take place just below the line to which the adhesions extend.

The rupture may occur in any of the lobes of the lung, but the inferior part of the upper lobe, and the superior part of that beneath it, is the place where it has been most usually observed. In a great majority of cases it has been found to happen on a line with the third rib, posteriorly about the costal angle, and, as we have said, just under the reflection of the false membrane by which the superior lobe is so generally adherent. But although this is its usual situation, it is obvious that it may happen at any part of the pulmonary surface. It has even been known to happen at the base of the lung lying on the diaphragm; but this must be a very rare situation, both because adhesions are common here from the apposition being little disturbed, and because tubercular cavities are uncommon at the base of the lung.

The existence of a large cavity, or even of numerous tubercles, is by no means necessary to the production of pneumothorax. We have known it to occur where the cavity which caused the perforation was smaller than a nut. Andral and others have met with cases where only five or six tubercles existed in the lung in which it happened, and Dr. Townsend had one remarkable case where it followed on the bursting of one single tubercle, which was unfortunately developed immediately under the pleura, while the whole of the lung beside, as well as the other lung, was perfectly free from them.

The inevitable consequence of the escape of the contents of the cavity and of the air into the pleura is the immediate accession of an acute pleuritis of a more or less intense character. This supervenes when scarcely any thing but atmospheric air is received into it, for this proves as decidedly irritant to the membrane as any other of the foreign substances which enter together with it, a fact which appears demonstrated by viewing the false membrane which follows the pleuritic effusion. The latter is found to be as thick and well organized at the superior and middle parts of the pleural sac, (where it could only receive the irritant impression from the air,) as the base of the sac upon which the fluid contents of the cavity are emptied. The lung being separated from the costal pleura at the first moments of the perforation, (as we have described,) becomes now compressed both by the air and the pleuritic effusion, so that, unless it be retained in points by old adhesions, the compression against the spine and mediastinum leaves a large proportion of the pleural cavity filled with air and fluid, constituting the double lesion of empyema and pneumothorax.* (See Empyema.) If the consequences of the perforation be not speedily mortal, the lymph effused by the pleuritis soon becomes organized, and forms a factitious membrane overlaying the whole surface of the compressed lung and costal pleura, where the air has been able to penetrate. This false membrane is not to be described, as some have done, as a thickening of the pleura. Even in its most perfect state of organization it may be perceived to be a deposition *upon* the pleura, which membrane lies under it, (although incorporated with it,) of its natural thickness. The lung itself lies compressed and flattened against the spinal column and mediastinum. In cases which have lasted some time, its diminution of volume proceeds generally till it is reduced to about one-fourth, and then, if its substance be cut into, the bronchial tubes and vessels are so matted up in its condensed tissue as to present the appearance called carnified lung. (See Empyema.)

While the false membrane forms a general lining for the sac of the pleura, the orifice of the perforation is spared, and the communication between the bronchial tubes and this cavity preserved. The perforation becomes converted into a fistulous opening with a smooth round edge. This orifice has a tendency to increase in diameter, and often attains the size of the tubercular cavity which originated it, but it rarely passes the size of a shilling. We lately had an opportunity of examining three fistulæ which afforded exquisite examples of the state of those perforations when they attain to a chronic condition. Their surface extended nearly across the cavity whose bursting formed them, and was covered with a

* This constant complication of pleuritic effusion with pneumothorax has given occasion to some to denominate it pleuro-pneumothorax.

smooth membrane of a serous aspect similar to that forming the general empyematous sac. They had the appearance of a shallow *cul-de-sac* about a line in depth, and the largest of them had the diameter of a shilling. On examining a little closely, a probe passed under the circumferential rim of the apparent cul-de-sac into a bronchial tube which communicated with a larger cavity. The disposition of the fistulæ here described is very common, viz. the perforation formed by the remains of a very small tubercular cavity, and the latter connected with other larger cavities by means of bronchial tubes.

The closer anatomy of these fistulæ presents circumstances which are particularly worthy of attention. The bronchial tube by which communication is maintained between the orifice and larger cavity is almost invariably found to open upon the face of the fistula towards the sac in an oblique manner from above downwards. This disposition is noticed as occurring in some of the cases detailed by Dr. Duncan in the 28th number of the Edinburgh Medical and Surgical Journal, and we have witnessed it very strikingly displayed in cases which lasted for a certain period after the perforation. The effect of this is to convert the orifice of the opening into a valvular structure, and as it were to aid in the accomplishment of this object, the superior rim of the opening is sometimes observed to be prolonged downwards for a short space over it. The method by which this structure is produced it is difficult to explain, but the end which it is intended to accomplish appears more obvious: at least an attentive examination of it in a strongly marked instance satisfied our minds that it results from an attempt at obliteration of the fistula by a process of nature. On the smooth face of the opening in the case alluded to, there were five small depressions which appeared to be stopped-up bronchial tubes, and the fistula which remained at the upper part was far advanced in the valvular structure. It seemed to us that those tubes were obliterated whose smallness and direction afforded the greatest obstacle to the entrance of air, while that which remained pervious was of the largest size; but what we would particularly advert to as explaining its resisting the process of obliteration, is the nearly vertical direction which it had with regard to the lung. According to our view, this position favours remarkably the entrance of air in such a case, as it lies directly in the line of the action of the diaphragm, by the contraction of which, almost solely, the air is drawn into the cavity in pneumothorax. Another circumstance bearing on this subject which was noticed in the same dissection* should not be omitted. ' The lining of the bronchial tube which formed the fistulous communication, a track of about two inches, was quite changed from the character of mucous membrane; it was no longer pulpy and soft like the latter, but partook more of the serous character, and there were remarked all along it firm granulations of considerable size. The same change was observable in the large excavation from which the fistula led; its lining was more like the lining membrane of the heart than the usual soft membrane which forms the secreting surface of phthisical cavities. (See Phthisis.) These observations go some length in explaining the mechanism of these oblique fistulæ, and we think they furnish also an intelligible and just account of the object which they are intended by nature to subserve, which we are led to conclude is an attempt to obliterate the fistulous orifice.

The general membrane of the sac is a highly organized secreting surface, and appears to be peculiarly susceptible of inflammation and its consequences. It must, indeed, be supposed to be in a continual state of chronic irritation, from the presence of the atmospheric air to which it is constantly exposed. There are frequently found upon it more or less organized albuminous concretions, the result of acute attacks of inflammation. These exudations are either general over the whole sac, or partial. They sometimes surround the aperture in the lung so as to narrow it, and cases have been observed where it has been closed altogether by them. The latter event would be most likely to occur† where the fistula is small and recent, or, on the other hand, where the valvular structure is far advanced. Another result of inflammatory action which it is not uncommon to find on the sac, is the existence of small erosions with a dark and irregular base and circumference, which resemble small gangrenous eschars more than they do common ulceration. These exhale generally a fetid odour which gives them also the character of spots of gangrene; and it is a fact which is confirmed by experience, that the sac is much more liable to gangrenous inflammation in empyema with pneumothorax than in simple empyema. The erosions just described sometimes penetrate the sac and pleura, and at other times they are not so deep, but go no further than the thickness of the false membrane. Their existence cannot but suggest the idea that perforation may occur by the ulcerative process originating in the pleura, and being propagated to the lung and bronchial tubes, as well as the contrary way, which we are considering in this section. The occurrence of pneumothorax originally in this way is, however, extremely rare; but we believe that, when it has already for some time existed, additional fistulæ are occasionally formed in this way.

The contents of the sac are in every case air and purulent matter. In the early stages of the affection the latter fluid is the secretion of the pleura itself, the effect of the acute pleuritis which follows the eruption of the air. When it has advanced to a more chronic duration, the adventitious membrane thrown out by the pleuritis becomes itself the secreting surface whence the fluid is derived. Its characters vary considerably, (see Empyema, Pleuritis,) and are influenced by the duration of the disease, vigour of the patient, and other circumstances. For the most part it is found to be a greyish turbid serum, through which homogeneous pus is mixed, and having an

* For an account of this dissection we refer to the May number of the Dublin Journal of Medical and Chemical Science.

† We are persuaded that this has been the state of things in many of the cases of pneumothorax on record, where it has been reported that examination failed to discover any fistulous communication.

abundant stratum of soft albuminous coagula at the bottom.

We have already marked the error which prevailed long after the discovery of pneumothorax, in supposing that the air was formed by the putrefactive decomposition of the pus. Such a decomposition of this fluid does not take place, but, on the contrary, it is generally remarked that it is inodorous, and free from any evidence of such a process. It is true that in some cases both air and fluid exhale a fetid odour, but in these we must search for other causes than the putrefaction of the fluid; for if this happened in one instance, it should happen in all, as the laws of chemistry do not alter or suspend their action, which would be implied by this hypothesis. In the instances in which we have noted the contents of the sac to be fetid, there was always a gangrenous state of the pleura to which the fetor was evidently to be ascribed; and as we have shewn that gangrenous ulcerations of the sac are not uncommon in pneumothorax, we are inclined to believe that they will be always found where the putrid odour is exhaled by the purulent matter.* The absence of the chemical decomposition of the pus is a fact which is now fully proved by experience; but when we consider the conditions to which it is subjected, it appears to be nothing wonderful that the idea was so long entertained, but rather remarkable that it does not invariably happen. It is constantly exposed to a warm temperature and to atmospheric air, which, together with moisture, are the essential promoters of the decomposition of organic compounds. Yet we have witnessed a case where these conditions existed for a year and a half, in which the pus was quite free from odour, and in all its qualities unchanged by the atmospheric contact. We are unable at present to go any length in discussing the cause of this curious circumstance, but we would observe that rest is a condition favouring chemical decomposition, which is absent in the present case. Some have considered that it is sufficiently explained by the fresh supply of animalised fluid, which the surface of the sac is supposed to maintain, by a continual secretion and absorption. The blood, when effused into the pleura, has been sometimes observed to remain fluid. We are not ignorant, as we have said, of the explanation of these facts, but they seem to prove that animal fluids have some power of resisting the laws of chemistry while preserved in contact with the living solid.

The air enters the sac through the fistulous opening during inspiration. When allowed to escape by a puncture of the thorax, it generally proves to be an inodorous gas, or possessed of a slight sharpness, but, generally speaking, it differs little from the atmospheric air whence it was originally derived. The same gaseous elements have been found to make up its chemical constitution, which has been examined by Dr. John Davy, (Philosophical Transactions, 1824,) and Dr. Apjohn, (Transactions of Association of College of Physicians, Dublin, 5th vol.) The following was its composition in Dr. Apjohn's analysis, which is the more recent of the two.

Carbonic acid	8
Oxygen	10
Nitrogen	82
	100

This coincides nearly with the composition of expired air as deduced from the investigations of Allen and Pepys, and it is by no means improbable that the surface of the sac acts on it in a similar manner with the air-vesicles of the lungs. Such an action has been, indeed, proved to have existed in Dr. Davy's case, in which analyses of the air were made at different periods. By a comparison of the latter, an interesting fact was deducible. It was found that the quantity of carbonic acid increased as the strength of the patient decreased, and the air which was collected twelve hours after death contained a double proportion of this gas.

In the great majority of instances the air, although free to enter the cavity, is either partially or totally prevented egress during expiration, owing to the valvular disposition of the fistulæ which we have adverted to above. When expiration takes place, the air of the cavity, compressed by the contracting thorax, forces the sides of the fistula together, and thus closes it, exactly in the same manner as the valve of the bellows prevents the air from going out by the aperture through which it entered. The consequence of this is, that the air exerts a pressure within the sac which is always increasing as long as the communication remains open. This compression is fully sufficient to account for the reduced size and flattened appearance of the lung which has been described above, and for the dilatation of the intercostal spaces, which is equally a phenomenon of pneumothorax. It has been a debated point, what part the air, and how much the fluid, contributed to the production of this internal pressure. To us it seems evident that the compression must be nearly altogether attributed to the air, and that the purulent matter exerts pressure only as it is itself acted on by the elastic fluid. The force with which the latter escapes when a small puncture is made in the parietes of the thorax, even some hours after death, (when a diminution of the pressure certainly takes place,) is well known. A fact which occurred in Dublin illustrated in a decisive manner the pressure which the fluid receives from the air. Paracentesis was performed on a man who laboured under pneumothorax with empyema, and the puncture of the chest was made below the level of the fluid, the evacuation of which was considered the chief object. Immediately on the entrance of the canula, the matter was projected through it with surprising force and to a great distance. Its forcible exit continued until it was nearly all evacuated, diminishing, however, towards the end of its flowing. This projection of the matter was undoubtedly to be ascribed to the great compression under which the elastic fluid existed. With respect to the relative proportions of the air and fluid there is the greatest variety. In the majority of cases the space filled by the air is much greater than that

* The fetidity which the bronchial mucus is often known to possess in phthisical patients may be another cause imparting bad odour to the contents of the sac in pneumothorax, as it has generally free access to it through the fistula.

which the fluid occupies. The nearest ratio might be set down as two-thirds air and one fluid. These proportions, however, vary not only in different cases, but also in the same at different periods. We are enabled often to ascertain that the fluid gains on the air, and sometimes, though seldomer, that the air increases at the expense of the fluid. In an interesting case detailed by Mr. Smeal, (Med. Chir. Review, July, 1831,) the fistula became obliterated from the formation of a coagulum, and speedily afterwards it was observed that the air became absorbed, and the fluid pari passu increased. This fact proves the manner in which the proportion of the elastic fluid is preserved, and moreover shows the power which the adventitious membrane possesses of absorbing air, as Nysten's experiments had already done for the pleura.

History and Diagnosis.—As the species of pneumothorax which we now describe is the consequence of phthisis, the history of an individual case, if it be investigated with due precaution and diligence, will almost universally demonstrate that cough, hemoptysis, emaciation, night-sweats, &c. (see Tubercular Phthisis,) have existed before the signs peculiar to pneumothorax betray its presence. It happens generally that phthisis has gone on to a very advanced stage ere this distressing complication is brought under the observation of the physician. This is, however, not entirely owing to its invariably occurring at a late period. Somewhat of it is attributable to the circumstance, that the means of its diagnosis have been hitherto scantily disseminated amongst the mass of practitioners, and to their not being used with sufficient confidence by those whose education has embraced them. Auscultation and percussion are now, indeed, daily becoming more practised and relied on, and as this advances it is accordingly found that many more cases are discovered, and moreover it is occasionally detected in the comparatively earlier stages of phthisis. From what has been related in the foregoing section as to its being known to result from very minute cavities, or even from a single tubercle, it follows that it is an accident which may occur in the earliest periods of the history of phthisis, even when the phenomena of the latter are so transiently marked as to be doubtful, and to allow of fallacious hopes of recovery. This, which we should anticipate from acquaintance with its pathology, has been observed in actual practice; its supervention has been witnessed at the very commencement of phthisis as well as at its close, so that what experience teaches is, that while the later stages are more exposed to its occurrence, it may happen at the period at which only the faintest suspicion of phthisis has as yet existed.

The means for the diagnosis of pneumothorax are the rational symptoms and the physical signs. We shall consider these separately, comprehending under the latter the signs derived from succussion, percussion, and auscultation. In the first place it is to be remarked that at the first occurrence of the pneumothorax, a striking change takes place in the entire class of symptoms and physical signs. Before this event there have been present, in a more or less perfect state, the phenomena of phthisis, but afterwards those which we proceed to describe as the characteristics of pneumothorax. This change, then, we would call attention to as in itself an important commencement of the chain of symptoms. The moment of this change is generally perceptible to the patient himself, and when this is the case, he dwells much upon it in his description to his physician. He sometimes feels, in fact, the air passing into the pleura at the moment of the rupture, as also the rupture itself. This sign did not escape the observation of our older physicians, although they were unacquainted with the pathological conditions which gave rise to it. Morgagni recites a case in which this sensation was accurately described, as observed by Willis and Lower: "Casum habes in sepulcreto descriptum adolescentis qui se Willisio ac Lowero curandum tradidit. Is post immodicas equitationes, aliasque corporis diuturnas exercitationes cum aliquandiu in sinistrâ thoracis parte eum sensum habuisset, qui esse sine internâ compressione non poterat, ibi tandem *sensit disrumpi quasi vas quoddam; indeque per semihoræ spatium in regione istâ ab alto in pectoris fundum cadentis stillicidium non tantum ab eo percipi, sed etiam ab adstantibus audiri potuit.*" (De Sed. et Causis Morborum, Epist. xvi.) This sensation has been, if possible, still more appositely depicted since the pathology of pneumothorax has been cleared up. We find the following description in Louis's forty-first case: "La malade éprouva *tout-à-coup*, du côte gauche de la poitrine, une sensation pareille à celle qui eût été produite par un gaz qui aurait circulé de bas en haut dans toute cette partie du thorax."* This actual perception of the perforation by the patients is an element of the diagnosis which it is so desirable to possess, that the practitioner should never omit to inquire after it, yet it is one which he must learn to dispense with, as many cases occur in which no such sensation has been felt, while in others, in which a certain period has elapsed, it escapes the patient's memory.

Empyema being invariably an accompaniment of this variety of pneumothorax, the symptoms of the latter are necessarily mixed up with those of the former. This circumstance demonstrates the insufficiency of the rational symptoms in detecting it, and partly accounts for the long ignorance which reigned on the subject. We find the symptoms of empyema set down as dyspnœa and pain, cough and expectoration, decubitus on one side, dilatation of the side, displacement of the heart, and depression of the diaphragm, hectic fever. These are found amply discussed as constituting the disease of empyema under its proper head (See Empyema.) The same catalogue precisely makes up the rational symptoms in pneumothorax It now devolves on us to consider them in this regard, and we shall find that accurate observation has been enabled to discover several peculiarities in them as belonging to pneumothorax, which render an account of them quite indispensable to

* Recherches Anatomico-Pathologiques sur la Phthisie, p. 461. The sensation, as related in a case of Dr. Stokes's, strikingly resembled the description of Morgagni; the patient, "while in the act of coughing, had a sensation as of a sudden crack, extending from the shoulder downwards, and felt as if a quantity of liquid was shed out into the left side of the chest." Trans. of Assoc. Dublin College of Physicians, vol. v. p. 337.

its history, and give them some importance as auxiliaries in its diagnosis.

a. Dyspnœa and pain.—These symptoms are to be considered at two periods. First, as they exist immediately on the occurrence of pneumothorax, and secondly, as present during the whole of the remaining duration of the disease. The dyspnœa and pain which follow immediately on perforation are nearly simultaneous with the sensation which we have above described, but they are still more constantly present, and therefore of more value in its diagnosis. The researches of Louis (Op. citat.) have called attention in a particular manner to these circumstances. He regards the sudden supervention of acute pain and overwhelming dyspnœa as a constant attendant on perforation of the lung, and as always indicating the period of its occurrence. They are, indeed, symptoms which are so rationally suggested by a knowledge of the new pathological conditions (viz. the sudden perforation of the lung, its collapse, and the effusion of air &c. into the pleura) which ensue, that they might have been anticipated by *à priori* reasoning, "et à raison de la similitude qui existe entre les circonstances qui accompagnent la perforation de l'intestin grêle, et celle des poumons, on aurait encore pu, ce nous semble, les soupçonner par voie d'anlagie." (Ibid. p. 476.) Louis relates seven cases, in all of which they were present; and we know that in one of them at least they occurred in the presence of the medical men, who were enabled to pronounce on the supervention of pneumothorax from this single circumstance. Their value has been also confirmed by the reiterated observation of them in the experience of others since his publication. We are, then, to regard a sudden access of violent pain in the chest, and of greatly aggravated dyspnœa, as symptoms of the greatest weight, and wherever they supervene in the course of phthisis, the occurrence of pneumothorax should be suggested to the mind of the attendant physician, who should immediately have recourse to other and less fallible means of exploration. Louis observes that the pain, although generally very acute, yet admits of varieties of intensity, and that it is not always in proportion to the sudden breathlessness which the perforation induces; and we find that in one of his cases he notes that the pain was entirely absent.

But here we must not omit to state that instances are not wanting which prove that neither singly nor collectively can these signs be referred to as decisive tests of perforation. Dr. Townsend records a case of pneumothorax from this cause, the commencement of which was marked by neither violent pain nor sudden dyspnœa. (Trans. of Assoc. of Dublin College of Physicians, vol. v.) We have also had a case in which the most careful investigation of its history could not determine the period of perforation from the sudden supervention of these symptoms. (Dublin Journal of Medical and Chemical Science, No. 3.) In estimating them, it is moreover to be remembered that the dyspnœa of phthisical patients is not uncommonly increased by other obscure causes; and, also, we should be on our guard against mistaking for such an occurrence pleuritic pains, which are so common in phthisis, and sometimes are of more than ordinary sharpness, without being by any means connected with perforation.

The dyspnœa which exists during the general duration of pneumothorax is deeper and more distressing than that of simple chronic empyema. This is, doubtless, partly occasioned by the coexisting sources of irritation of the pulmonary circulation which phthisical patients possess. A cause of equal efficacy and more uniform existence is found in the resistance which the elasticity of the air affords to the great pressure under which it exists in pneumothorax. This causes such a condensation of its volume before it produces the compressing effect of a liquid effusion, that even the greatest expansion of the thoracic parietes can but partially overcome its reaction, so that the dyspnœa resulting from their compression is but partially mitigated by the deepest inspiration. Such a condition is not present in simple empyema, as it is obvious, from the non-elastic nature of the fluid, that deep inspiratory efforts may expand the thorax beyond the limits of its compressing action, which therefore does not maintain a constant embarrassment of breathing, as it does not react (like the elastic fluid) on the immediate compression being temporarily withdrawn.

This appears to be the rationale of the aggravated character which the dyspnœa of pneumothorax possesses. The slightest exercise produces great oppression if the patient be able to walk, but ascending stairs causes particular distress. Even the motion of turning or raising himself in the bed leaves him often speechless from breathlessness for a short time. In the latter case we might conjecture that the fluid is in large proportion, as its mere weight has great influence on the breathing in changing the posture.* If the duration of the disease permits it to assume a chronic character, the dyspnœa rather diminishes than increases, although the internal compression shall not be mitigated. This is attributable to that surprising power of adaptation to circumstances which the animal economy enjoys, and which is possessed in an especial degree by the respiratory and circulatory organs. However, whatever fluctuation it may undergo during the course of the affection, as in all thoracic diseases, it becomes aggravated at its close.

The acute pain which ushers in its commencement generally subsides in a short time, and afterwards it runs its course without marked suffering from this cause. But more usually, if the patient lasts, he is subject to violent recurrences of pain which have been traced in some instances to recent inflammations of the sac, and also to the establishment of new fistulæ. These attacks of pain are in themselves additional sources of the dyspnœa; it follows, however, of course, that no secondary occurrence of inflammation, nor opening of new fistulæ, can produce the same degree

* This remark as to dyspnœa produced by sudden change of posture, is a valuable diagnostic of fluid effusions of any kind in the chest, particularly where these complicate pneumothorax. The description which Morgagni gives of it in what was anciently called convulsive asthma, must be appropriated to such cases, and particularly to that which we treat of. "*Statim anheli fiebant, ac velut moribundi respirabant*, cum retrorsum caput moverent, aut supini," &c. De Sed. et Causis Morb. Epist. xv.

of pain or overwhelming dyspnœa which ensues upon the original perforation.

b. Cough and expectoration.—These symptoms, which are more or less present in every pulmonary disease, form no essential accompaniment of pneumothorax. No case indeed is altogether free from them, but they are rather to be classed with the signs of phthisis which has preceded it, or with those of the pleuritis which accompanies it, than to be referred to the affection itself. On more than one occasion we have been enabled to mark their connection with bronchitis supervening in the opposite lung. Even a slight degree of cough is harassing to the patient, and in the rare cases where it remains frequent it causes extreme anguish. It is performed in a very laborious manner, in which an instinctive endeavour to refrain from agitating the contents of the thorax is perceptible to the medical observer. This gives to it a peculiar expression, so that we find sometimes set down, in accurately taken cases, "dry, husky, ringing," as the character of the pneumothorax cough. It has occurred to us, while observing it, that it resembled very closely the cough of a broken-winded horse. The distress which it occasions makes it important to attend to this symptom, and an acquaintance with its peculiar character may assist in distinguishing the affection. It is, however, sometimes nearly entirely absent. In a case of Dr. Stokes's, the dissection of which we attended, a complete cessation of both the cough and expectoration took place simultaneously with the occurrence of pneumothorax, but they returned with severity when tubercles in the other lung began to soften.

The expectoration is for the most part scanty, and possesses no peculiar characteristic, but in some rare cases it happens that the fluid contents of the pleural cavity make way through the bronchial communication. When this occurs, the evacuation of the matter is attended with terrible dyspnœa, threatening, when it is copious, sudden suffocation.

It is known that the patients who are operated on for empyema sometimes acquire a power of assisting the expulsion of the matter which collects posterior to the operation, through the wound of the side, by forcible expiratory efforts and coughing. We mention this to notice the case of a porter at the Meath Hospital, affected with pneumothorax and empyema consequent on perforation of a tubercular abscess. This man possessed an analogous power of *expelling at will* the fluid of the cavity through the fistula in the lung. He was accustomed to exert this whenever it accumulated to a certain quantity, by leaning over the bedside so as to invert the thorax, and thus decant it through the mouth, aiding its escape by some efforts of coughing. Another singular circumstance worth noticing was remarked in Dr. Stokes's case just referred to. When the irritation of the opposite lung caused a return of the expectoration, the patient was sometimes unable to raise it out of the trachea, but was sensible of losing command over it when it ascended as far as the top of the sternum. In fact he felt convinced that it used to drop down the bronchus leading by the fistula to the pneumothorax cavity.

c. Decubitus.—If the fluid contents of the pleural cavity be very small in quantity, the patient may recline indifferently upon either side or upon the back; but in the majority of accurately observed cases he has been found to lie in preference on the affected side. This is the conclusion that our inquiries have led us to; but different statements are found in authors on this subject. It is stated by Schmalz, (Versuch einer Medizinisch-Chirurgischen Diagnostik, Dresden und Leipsig, 1825, p. 99,) and other writers, that the decubitus is invariably on the sound side in pneumothorax, and that this affords a striking mark of distinction between it and empyema. We cannot help suspecting that this opinion has been originally rather conceived from theory than deduced from observation, and we the more readily make this remark from observing the occasion and the manner in which Dr. Duncan (Edin. Med. and Surg. Journal, No. 28, p. 327) announces it. "The change of decubitus," says he, describing a case, "*is exactly the reverse of what it ought to have been*, for in empyema the patients commonly lie on the affected, and in pneumothorax, on the sound side." The reasoning, too, with which this has been advanced (See Med. Chir. Review, July 1830, p. 455) is only applicable to the infinitely rare case of simple pneumothorax, and not to that which results from perforation, for this is always accompanied by empyema. It is true that in empyema the dyspnœa is caused by the pressure of fluid alone, and it is chiefly for the purpose of relieving the mediastinum and opposite lung of its weight and pressure that decubitus takes place on the affected side. (See Empyema.) But in pneumothorax the compression of the internal organs is as complete, if not more so, although caused by air, and if the *weight* of even an inconsiderable quantity of fluid should be added to them already suffering under this great compression, it will be an object with the patient instinctively to obviate this by lying on the affected side. As far as our experience goes, this position has been, *cæteris paribus*, always preferred. However, it not unfrequently happens that the violence of the pleuritic pain forces the patients to turn to the sound side in spite of the increased oppression which the change induces. We have witnessed a case in which the struggle between the pain augmented by lying on the affected side, and dyspnœa aggravated by changing to the opposite, was extremely distressing; but here the want of breathing triumphed over the pain, and compelled the poor patient to endure the latter as the lesser evil. When the intensity of the pain has passed, if a change has taken place during its continuance, decubitus on the affected side is usually resumed.

d. Dilatation of the side.—On a comparison of the two sides of the thorax, it is observed that the side in which the pneumothorax exists is faintly or not at all elevated during inspiration, and on being measured it is generally found to be larger than the opposite. These differences may be observed at a very early period after the perforation, but for the most part they are greatest at the advanced periods of the affection. The average amount of the dilatation is from one to two inches, as in empyema. The enlargement of the intercostal spaces and their occasional protrusion beyond the level of the ribs are also observable in

both, so that, from the mere contemplation of the phenomena of dilatation, there exists no distinctive mark between them. It is said, however, that where they are very conspicuous in pneumothorax, the side is more what the French denominate "bombe" than in empyema. The œdema of the integuments of the side which sometimes attends the latter is not observed, although Louis and others have remarked an œdematous state of the corresponding arm.*

Many instances of pneumothorax are on record in which no difference whatsoever existed in the dimensions of the two sides of the chest. It may be observed that in cases where the air can pass out during expiration from the non-existence or imperfect formation of the valvular arrangement of the fistula before described, the chief source of dilatation, namely, the accumulating pressure of the air, is absent. This valvular structure has not been hitherto much attended to; it has, however, been remarked that in some of the cases where there was no dilatation, the fistulous orifice was very large, rendering it probable that egress from the cavity as well as ingress remain unobstructed. But it must be acknowledged that this suggestion is by no means sufficient to explain the absence of dilatation of the side in many well-authenticated cases, in which the air was proved to have been subjected to very great pressure, evidenced by displacement of the thoracic viscera and other phenomena.†

We had an opportunity of demonstrating that the dilatation of the side varies considerably, and that it may even give place to contraction. At an interval of six months between two measurements of a case, it was found that the pneumothorax side (measuring from the centre of the sternum to the spine of the vertebræ), from being one inch wider had become half an inch narrower than the other. And further, on measuring five months afterwards, it was found to have returned to its former dilated dimensions. We believe that we were enabled to connect this temporary decrease of dilatation with a partial closure of the fistulous communication, and an attempt at cure, as happens when empyema is removed by absorption. The progress of the case, however, (during which other fistulæ formed,) and its termination, did not allow us to confirm this anticipation; but notwithstanding this, the nearly total departure of the tintement coinciding with the contraction and other phenomena left little doubt that such was really the case. (Dublin Journal of Med. Science, Nos. 3 and 8.)

Schmalz says, (Op. citat. Ibid.) "If both sides be engaged, the chest exhibits nearly a cylindrical form." Of the occurrence of double pneumothorax the only two cases recorded that we know of are those in Laennec's work. In the first of these, observed by M. Recamier, the chest is described as "vaste, bombé," terms which have probably suggested the description of Schmalz. Notwithstanding the extreme rarity of both sides being involved, it may not be useless to retain in memory this symptom of general dilatation, as in such a case many of the other signs must be of no avail, inasmuch as they require the contrast which is afforded by the opposite side remaining sound; and it is of the greatest importance to be able to recognise this terrible affection at once, in order to attempt the relief of the dyspnœa by performing paracentesis, the only means which art suggests to prevent speedy suffocation.

e. Displacement of heart and depression of diaphragm.—It appears that less compression is requisite to affect these conditions than to produce dilatation of the side, for the latter has been absent in cases where the heart has been thrust considerably out of its place, and a sensible fulness produced in the corresponding hypochondrium by the depression of the diaphragm. It is here a proper place to remark the singular fact that perforation of the lung and its consequences, in the great majority of cases happens on the left side. Seven of eight cases, which occurred to Louis, were on this side, and we believe that in the cases which have come to our knowledge nearly an equal preponderance existed. So great a disproportion must have been in some degree accidental, for in eight cases described by Laennec the number on each side was equal. However this may be, it is certain that it occurs oftener on the left, and this circumstance makes displacement of the heart a very common and striking feature in pneumothorax. In cases of extreme displacement, the heart's action is both felt and seen beyond the cartilages of the opposite side, but the average extent is not farther than the opposite half of the sternum, or below the ensiform cartilage; for it is found to move downwards as well as laterally when the displacement occurs from left to right. When the pneumothorax exists in the right side, the heart's displacement, for obvious reasons, will be less, but the depression of the diaphragm will be more easily perceived from the protrusion of the liver which follows it. This prominent state of the liver is as truly an effect of depression of the right side of the diaphragm by an aëriform collection as by an empyema; and, as in the latter, it might at first view lead the observer to conclude that the oppression of the respiratory organs was connected with a visible hepatic enlargement. This has been adverted to in the article EMPYEMA; but in a paper on the diagnosis of the latter (See seventh number of Dublin Journal of Medical and Chemical Science) by Dr. Stokes, since published, there are some additional signs furnished, which contribute much to the elucidation of this point of diagnosis. We shall notice here but one of these, which is as applicable in pneumothorax as it is in

* It appears, from Morgagni, that this œdema of the arm has been frequently noted by the older physicians in pneumothorax. "Verum præterquam quod brachium alterum, quod dolebat, œdemate habebat tumidum (qualem tumorem in thoracis hydrope Fantonus pater, et Buchnerus, aliique, et in his Valsalva noster interdum adnotarunt) *cum ad thoracis motum diceret fluctuationem in eo sentire*," &c. Morgagni de Sed. et Causis Morb. Epist. xvi. s. 36.

† See Dr. Duncan's tenth case, Edin. Med. and Sur. Journal, No. 28.; Dr. Stokes's case, Trans. Assoc. Dublin College of Physicians, vol. v.; and five of Louis's cases, marked "Etat exterieur, de remarquable," which amounts to evidence of no dilatation, for this exact observer has noted it particularly in the cases where it was present. In Dr. Duncan's case a method of opening the thorax was practised by Dr. Cullen, which is worth relating. Instead of penetrating the sac at once, which is usually done, he dissected back the ribs and intercostals for a considerable space, so as to expose the external surface of the pleura, which rose up distended and elastic. This way is somewhat more troublesome, but it is very advantageous for estimating and displaying the pressure which the air exerts

empyema. It has, moreover, a peculiar propriety in the former, as it is a palpable sign, and addresses the eye at the first examination; because we apprehend that the effects of pneumothorax and enlargement of the liver could be confounded only where a defective exploration had at first produced an erroneous impression, unless the air be very small in quantity and the fluid copious, in which case the difficulties connected with empyema recur. Dr. Stokes, however, has observed, that where the diaphragm, depressed and rendered convex downwards by the contents of the pleural sac, causes the descent of the liver, there is a sulcus evident to the sight and touch in the right hypochondrium. This is produced by the two convex surfaces of the diaphragm and liver, respectively terminated anteriorly by the edge of the latter and by the inferior margin of the false ribs. It is manifest that such a sulcus cannot be present in the mere enlargement of the liver, let it take place to any extent, as it requires the opposed convexity of the diaphragm for its formation, and this condition is only produced by a liquid or gaseous effusion.

f. Fever.—Whatever has been the condition of the circulation before the escape of the air by perforation, the fever of pleuritis sets in speedily after this event takes place. Its character is necessarily modified by the previous state of the patient's system, but it always conspires to aggravate his sufferings. Much, indeed, of the dreadful distress which ensues is to be ascribed to the increased febrile action which occurs almost simultaneously with the accident. This will be conceived when it is recollected that while one of the lungs is by rapid compression nearly deprived of its function of respiration, the excitement of the heart's action increases the demand for aeration, so that this combination of circumstances often produces a degree of dyspnœa under which the patient rapidly expires. Such an effect of the fever is not more likely to occur in debilitated individuals than in those of robuster stamina; for in the former, although the constitution be more exhausted, this seems fully counterbalanced as regards the effects in question, by the diminished quantity of blood which circulates in the system of emaciated phthisical patients.

If the immediate consequences be not fatal, the fever subsides into the same type which existed before perforation occurred. This is the hectic of phthisis, in which the pulse seldom sinks below 110, and is exacerbated in daily paroxysms. We are, however, led to believe, that if the opposite lung be not already the seat of tubercular deposition, or even if this be not in an advanced or progressive state, the phthisical hectic which attended the disease of the lung that has suffered perforation, is diminished by the supervention of pneumothorax. We have witnessed one case and heard of another in which the hectic pulse and night sweats could be traced to have actually ceased from this period. In both instances, it is true, the cessation was but temporary, but we had unequivocal evidence that their return was contemporaneous with the occurrence of disease in the opposite lung.

The foregoing is a detailed account of what are called the *rational* symptoms. Their study is of great importance in understanding the disease, and it must be acknowledged that several amongst them are valuable diagnostic signs. We proceed now to describe the *physical* signs. It would be a needless task, at the present day, to use much earnestness in insisting on the importance of these in the exploration of any thoracic disease, for it is fully recognised. We must remark, however, with respect to pneumothorax, that just in proportion as the practitioner has attained to a masterly facility in their application, will he be enabled to decide with certainty as to its presence or absence. The very existence of this affection in nosology is so intimately connected with its physical signs, that until these were discovered it lay still unnoticed, and correct notions on the subject advanced as they were developed and improved. Hippocrates laid the foundation for its future diagnosis by the practice of succussion, and had he pushed its application a little further, he must himself have arrived at its real signification, as it appears, from some of his remarks on its use, that he was partially aware of some of the conditions necessary for its production. Corvisart and Bayle, masters of percussion, had glimpses of its nature, and remarked its existence in the dead body. Laennec, whose merit in this instance was as great in perfecting and applying the other two signs as in adding his own famous discovery, was the first who detected it on the living body. He brought its diagnosis to perfection by assigning to the physical signs their value separately and in combination; and if any additional light be thrown on its history or symptoms since his time, even this must be ascribed almost wholly to the greater facility and confidence with which it is now recognised by the employment of these means. These considerations are sufficient to show the great importance which attaches to these physical signs in pneumothorax: upon them, in fact, rests its diagnosis, and he who is skilled in their application may truly pronounce upon this affection, which has remained for so many ages of medicine in obscurity, in as positive a manner (as Andral speaks of these principles applied to thoracic diseases in general) as the surgeon can "of the least complicated dislocation, or the simplest fracture." (Clinique Médicale, Avantpropos, p. 6, tome ii.)

a. Succussion.—Whenever air and fluid exist together in the sac of the pleura, if the trunk be shaken abruptly, the splash of the liquid against the walls of the thorax is often distinctly heard by the patient, or by any one who places their ear on or near the chest. There is no stronger evidence of pneumothorax than this sound, for it is only produced where both air and fluid are present; if either be absent, no splashing sound is heard.

In the writings of Hippocrates this method of exploration was taught as a means of ascertaining the existence of purulent matter in the pleura. Distinct directions are enjoined as to the manner of performing the succussion, and even observations added from which it is apparent that the author could estimate by this means the quantity of pus contained in the pleura: "Among the patients affected with empyema, those who produce most sound, when shaken by the shoulder

have less pus in the chest than those who yield less sound, and who are more flushed and breathless: in respect of those who do not yield any sound, but who have the nails livid and a great dyspnœa, they are full of pus, and their case is desperate." These remarks contain much truth, and implying as they do considerable acquaintance with the phenomena, it is a most remarkable circumstance that they did not conduct their author, or his admiring commentators for so many ages afterwards, to the knowledge of the real condition which they indicate. Laennec points out the reason why, while such close approximations as that quoted from Hippocrates appeared as it were to leave only another step to unfold the truth, they remained as far removed from it as ever until a very late period. It consisted in a fundamental error as to the natural state of the lungs and pleura. The early notions were a mass of confusion on this subject, but for the most part it was conceived that a vacuum existed in the thorax. This absurd hypothesis precluded the necessity for the presence of air to cause the sound of fluctuation, and being handed down from age to age prevented the truth from reaching the mind even of such men as Morgagni. It is obviously inferrible, from the quotation which Laennec makes from the latter, that this great pathologist believed that the fluid of an empyema was poured out into an empty space in the pleura, which, after a certain quantity of effusion, became filled. In the quotation which we now insert, this opinion is not left to inference, but alleged in the most explicit terms, and even adduced as the only way of explaining the sound of the fluid in a case of pneumothorax. Referring to the "stillicidium cadentis humoris," which we formerly quoted from him, Morgagni says, "Res non ita facilis explicatu iis *qui inter pulmones et thoracis parietes negant spatii quidquam intercedere; vera tamen, ut postmodum comprobavit humoris, in eo latere congesti, cum fluctuatio in agitatione corporis ab ipso, ab aliisque evidentissime percepta*," &c. (Prænot. Coac. ii. 432. Forbes's translation of Laennec, p. 507.) On such an hypothesis the sound of fluctuation should have been heard in every case of empyema, instead of being, as we now know it to be, confined solely to the case where this is combined with pneumothorax. It is very probable, then, that its abandonment is to be attributed to its having failed to detect simple empyema, which it could never have done. It is moreover certain, from the description, that the cases designated by Hippocrates as "full of pus," and which Morgagni would have embraced under those "qui ad summum pervenerunt," were cases of simple empyema, and it shows that, although these great physicians were prevented from seeing its true cause by a false hypothesis, they observed with accuracy and fidelity; as in such cases no sound of fluctuation is heard, the "*space being filled up*," as Morgagni said.

Thus this invaluable diagnostic fell into neglect; there is no evidence of its having been used after the time of the Asclepiades; and even the commentators appear to have esteemed it as useless, and to have alluded to it, as Laennec remarks, merely out of respect to Hippocrates. It was not revived till the true causes which produce it became fully explained, but since that period it has been ranked as one of the most infallible signs by which any internal disease can be recognised.

The Hippocratic method is still generally used in the employment of succussion. While the physician places his ear to the side of the thorax, an assistant shakes the patient smartly by the shoulders, and thus the dashing of the fluid is heard. It frequently happens that the patient is the first to call attention to it by mentioning that as often as he turns over in the bed he is sensible of this sound himself. It is felt by him on descending a stair, or, as we have known, when he makes a forward step with greater quickness than usual. Besides the little confidence which Morgagni placed in it as an indication, he objected to the Hippocratic method that many patients would not suffer willingly the concussion of the trunk. While this remark cannot have the effect which he intended, yet it is worthy of attention. Laennec denies that it is attended with any inconvenience, but in the cases in which we have seen it employed, a very considerable commotion was caused to the patient before the fluid could be heard. An intelligent man, who was under our care for a very long period, was accustomed to produce the fluctuation himself by making a jerking rotation of the trunk on the spinal column. He was enabled to produce the sound with much facility, and greatly preferred doing so himself in this manner to being succussed in the ordinary way by the hands of another. We can conceive that in certain cases such a method would be as impracticable as the former; we leave them both, therefore, at the option of the practitioner, who will of course choose that which causes least disturbance to the patient.

This fluctuation might be also produced by an enormous phthisical abscess half full of matter and air; but such a cavity as would be sufficient to give rise to it is scarcely ever met with, having occurred but once in the large experience of Laennec. There is also a possibility of being deceived as to the source of the fluctuation, if the stomach contain much flatus, and the patient has recently taken drink. The other physical signs will easily preclude the latter error; but its infinite rarity alone seems to be the only protection from the former.

b. Percussion and auscultation.—Laennec has demonstrated, from a review of the knowledge which Avenbrugger, Corvisart, and Bayle possessed on this subject, that percussion alone was insufficient for the diagnosis of pneumothorax. When the side affected is percussed, an unnaturally clear or tympanitic sound is returned, and if this coincide with dilatation of the same side, the evidence for pneumothorax is very strong. From these data Bayle was enabled to recognise it in the dead body in two or three cases; and doubtless, if its pathology had been understood in his time, he would have detected it from the same evidence on the living. But even in the hands of the most experienced master of percussion these signs might lead to a deep fallacy, for it might be thought that the clear-sounding side was in a healthy condition while the other was the seat of either pulmonary engorgement or a pleuritic effu

sion, which produced the comparatively dull sound; and as to the dilatation of the side, it is liable, when considered only in conjunction with percussion, to lead to the same error; that is, the dilated side might be mistaken for the sound, and the latter regarded as in the state of contraction which results from chronic pleurisy (See PLEURITIS); and again, the converse of this error is also possible, in which the contracted side should be mistaken for the sound side, and the latter considered as dilated and too resonant. That these difficulties of diagnosis from these means are not imaginary our own experience has convinced us as well as the warnings of Laennec, (Forbes's Translation, p. 497); they are, however, quite removed by adding to percussion the results of auscultation. On applying the stethoscope to the pneumothorax side, it is found that the respiration is as completely absent as if it was an empyema; but percussion has already proved that, instead of the perfectly dull sound, which a collection of liquid in the chest causes, we have now a preternatural clearness of sound, which two conditions, viz. nullity of respiration and clear sound on percussion, never coexist except in the case of air in the cavity of the thorax.

Although we have indicated the percussion sound of pneumothorax to be exceedingly clear and tympanitic, occasional deviations to a certain extent from this general rule are met with. It will be recollected that when pneumothorax takes place, the expansion of the air vesicles of the opposite lung becomes much increased from having to perform the compensatory respiration, and consequently the clearness on percussion of this side is simultaneously increased. This is one cause why the *contrast* on percussion is not so striking as might be anticipated, and it suggests how much more valuable this sign would be were it possible for us to contrast the sound of the *same side* before and after the period when pneumothorax was supposed to occur. Another circumstance which occasionally prevents the drum-like resonance peculiar to this affection from being produced, is the existence of partial adhesions which sometimes retain the lung in spots still in contact with the costal pleura. In the points corresponding to these the sound on percussion will still be dull, while the clearness will be perceptible in the intervening spaces. It is also to be remarked that, although we have laid down nullity of respiration as the rule, this is seldom absolute. Close attention will almost invariably discover a feeble bronchial sound at the root of the lung along the spinal column, which may sometimes lead the observer to imagine that he hears the puerile respiration of the opposite lung conveyed across the spine. But besides this, if there be any points of adhesion, they may cause a faint murmur to be heard. These adhesions may exist at any part of the lung, but as we have in a preceding part shown that they are very common at the summit, so we are not unfrequently enabled to discover, immediately under the clavicle or in the supraspinal region of the scapula, the sound of respiration generally of a cavernous character, and mixed with a single bubble of gargouillement. These latter signs may be considered as marking the remains of a cavity (see TUBERCULAR PHTHISIS), and this is sometimes confirmed by the coexistence of an obscure pectoriloquy.

The fluid which is contained in the cavity is recognised by these signs with the same facility as the air. By the absence of respiration we learn that the lung is now displaced by either fluid or air. This being established by auscultation, the results of percussion enable us to appreciate the space in the thorax which is occupied by the liquid and gaseous fluid respectively. As percussion is performed from above downwards, the tympanitic resonance is perceived to give place at a certain level to a total dulness of sound, and where this change abruptly occurs is the line of demarcation between the air and fluid. By marking from time to time the situation of this line, it is manifest that we can ascertain whether the proportion of the air and fluid remains stationary, or if either of them increase at the expense of the other. Finally, it may be instructive to examine their relations under changes of posture, to observe how the liquid obeys the law of gravity, and the tympanitic sound shifts as the air moves to occupy the space vacated by the heavier fluid. Such investigations furnish data from which an acute observer may form a conjecture as to the existence of adhesions, the size of the cavity, and even the amount of the compression sustained by the viscera; upon which points it may be of the highest importance to obtain any additional light, particularly if the idea of paracentesis be entertained.

The signs of pneumothorax derived from auscultation and percussion, so far described, are almost purely of a negative character; but even were the diagnosis necessarily confined to them, there is but one disease for which it could possibly be mistaken; this is emphysema of the lung, or dilatation of the air-cells, many of the characters of which are, however, so clearly distinguished from it, that it could only be confounded with it by a very inattentive examination. They resemble each other in the clear resonance which percussion gives out, and also in the negative results of auscultation. But the respiration is never totally absent in emphysema of the lung, as in pneumothorax; it is only much weakened, and is moreover accompanied by its peculiar râle, which strikingly opposes them. The history and general phenomena are quite distinct; the emphysema is always a chronic malady, and the patient is able to go about; although complaining much of difficulty of breathing, it is more because it interferes with his occupations than from the deadly anguish which overwhelms the patient in most cases of pneumothorax. If these considerations be not sufficiently convincing, the presence of pneumothorax (from perforation at least) may be decisively determined by succussion and the metallic tinkling.

The inventive genius of Laennec was not content with these negative results of auscultation. Apparently not long after he had laid the foundation of its diagnosis in these, his perseverance was enabled to add to them a positive sign, the *tintement métallique*. This is a metallic tinkling or ringing sound, heard in the pneumothorax cavity at intervals. It is discerned equally well by the naked ear or by means of the stethoscope, but to examine it accurately and to mark its limits, the

latter instrument must be employed. It is so accurately represented by the dropping of a pin into a large wine-glass, or touching gently a sonorous porcelain vase with a quill, that it may be recognised without the observer having previously heard it; by keeping this comparison in mind, having been once heard, it is always remembered.

The metallic tinkling is audible during coughing, speaking, and sometimes during respiration, or it might be more correct to say after these actions. Besides this, it is often heard independently of these, observing a certain periodicity, and finer in its tone. That the finer tone which we have just alluded to is the echo caused by the occasional fall of a single drop of fluid from the summit of the cavity on the surface of the liquid, we only require to imitate it by letting fall into a large wide-mouthed bottle, one-third full of water, one drop of any liquid, to be fully convinced. This variety of the tinkling is explained in this manner by Laennec, who has also proved demonstratively that the sort which results from speaking, coughing, and inspiration, is produced by the air entering through a fistula into the pneumothorax cavity. He did not announce more particularly its proximate cause, and where this master did not speak, it might become us to be silent. We may state, however, without presumption, that we never had any hesitation in explaining this variety of the tintement on the same principles as the other. It appears to us to be manifestly the echo of the air forced into the cavity reverberating against its hollow parietes, and that the sound is more particularly caused by the bursting of minute air-bubbles at the orifice of the fistula, formed as the air traverses the latter, by its entanglement with mucus. It is more clearly audible in proportion as the cavity is empty of fluid; but its distinctness and loudness are chiefly dependent on the size of the fistulous communication. We have been enabled to follow the gradual narrowing of the latter by the diminution of the tinkling in one remarkable case. It became so minute that it was by the greatest stretch of attention scarcely perceptible on respiration, and at length became inaudible, but it still persisted on speaking and coughing. At an after period the whole train of symptoms became exacerbated, and the tinkling was again manifest on respiration; and by degrees, as the malady grew worse, it increased to a louder and graver pitch than ever. This is indeed the ordinary change which it undergoes; in most cases the fistulous orifice rapidly enlarging in size, the tintement is heard more and more plainly on respiration, and at length it becomes so deepened in tone as to assume quite a different character.

To the metallic tinkling altered thus by the deepening of its sound, the name of *bourdonnement amphorique** has been given. It is so called because it exactly resembles the sound produced by blowing into a decanter or large bottle. When this sound becomes evident, it is a sure indication that the fistula is growing larger, and consequently that the case is more hopeless.

In exploring for the metallic tinkling, there is a source of fallacy which the physician should be aware of. When the stomach is flatulent, it lies high under the false ribs, and if in this state the patient has lately taken drink, the tinkling may be produced in the stomach, and lead the observer to think he hears it in the chest. On the other hand, an incident occurred to the writer of this article, which shows that this source of deception may be held too strongly in view. In examining a case which at first view he had imagined was empyema, the tinkling was evidently perceived; but finding the epigastrium tympanitic, it was disregarded, from the conception that it was produced in the stomach. On the second or third examination the sound was again heard, and now recognized to be the true metallic tinkling.

The only other condition besides pneumothorax which can give rise to this sign is the existence of a vast phthisical abscess, such as also produces the sound of fluctuation. Laennec relates its occurrence in a phthisical abscess of such a size that the whole lung was nearly involved in it; but such instances are so infinitely rare that they will never embarrass the diagnosis.

The production of the metallic tinkling in a phthisical cavity, we would remark, is a circumstance quite inconsistent with the views on the subject which Mr. Guthrie has lately published. This gentleman states that Laennec, and all who hold, with him, that it "depends entirely on the passage of air through a hole in the lung into the cavity of the thorax," were mistaken; and in opposition to this he maintains that for its production the air of the cavity must necessarily be compressed. "I do not," says Mr. Guthrie, (London Med. and Surg. Journ. for Jan. 12, 1833, p. 477,) "deny the facts of the air, the hole in the lung, or the fluid; but I believe that, to produce the sound of the Jew's-harp (the metallic tinkling,) the air in the cavity must be greatly compressed, and that it essentially depends upon it." That this latter opinion is unfounded, its occurrence in large tubercular cavities, which has been observed by most who are much conversant with phthisical auscultation, sufficiently proves. In such the air can suffer no compression. It is besides well known to exist after the operation for empyema; and we have never heard it more audible than in a case of pneumothorax caused by the bursting of an anthrax of the intercostal spaces into the pleura, in which the external fistula remained open.

We have now concluded the account of the diagnosis, but as we have been necessarily diffuse on some of the points, we think it may not be superfluous here to recapitulate, so as to give at a glance the principal diagnostic signs. By subjoining to each a word of valuation, the reader will be able to calculate the amount of evidence implied by the presence of any one of them.

1. The sensation of something giving way in the chest, and of air entering the pleural cavity.—Very valuable, but often absent or unnoticed.

* We would gladly use English words, but cannot devise any that would justly anglicise the above; we have, therefore, thought it better to leave the expression which the discoverer applied. Nothing can be better than metallic tinkling, but it appears to us that "utricular buzzing," which is used in the valuable translation of Dr. Forbes, although a correct synonym, is scarcely less foreign than the original.

2. In a phthisical individual the sudden supervention of overwhelming dyspnœa and pain.—Rarely absent, therefore very valuable; still more so if succeeding last sign.
3. Comparison of auscultation and percussion. Nullity of respiration over one side, together with tympanitic clearness of sound, which below terminates abruptly in complete dulness.—If accurately established, amounting to positive certainty, but sometimes not easy to establish. Ægophony rare.
4. Fluctuation on succussion.—Positive certainty, but should be unquestionably verified.
5. Metallic tinkling.—Positive certainty, but should be unquestionably verified.

Prognosis and treatment. On casting our regards back on the pathology of this affection, we cannot be astonished at any thing which experience can teach us, as to the rapidity and certainty with which it is followed by a fatal result. When we consider the prognosis of phthisis, and add to this the aggravating circumstances of perforation and acute inflammation of the pleura, together with the simultaneous privation of the function of one lung, the consequences will appear to be so inevitable and immediate, that our review of its pathology and symptoms may seem to be a dissertation on a nice point of morbid anatomy and diagnosis, or only useful so far as an acquaintance with it may prevent the physician from being taken by surprise by the supervention of its fearful indications in a case of phthisis. And, indeed, if all knowledge were useless that did not immediately lead to practical benefit, this would be in a measure true; for it must be confessed that at present it does little more than unfold to us how soon we may expect a period to be put to the patient's sufferings. The result of Laennec's experience of it is more fairly drawn from the statement which he makes for the purpose of contrasting it with emphysema of the lungs, than where he specially speaks of its prognosis. "The effusion of air," he says, "comes on suddenly, and cannot exist for any length of time without giving rise to severe symptoms, and even death. I have never seen pneumothorax in any person who was not confined to bed." (Forbes's Trans. p. 499.) Louis only speaks of the result with a view of calculating the time which elapses between the period of perforation and death. (Recherches sur la Phthisie, p. 487.) Dr. Stokes relates his case, which lasted five months, as the longest at that time on record; (Trans. Association, &c.;) and in upwards of twenty cases witnessed by Dr. Townsend, none, we believe, lasted so long a period. In Louis's seven cases the fatal termination took place at intervals of from sixteen hours to thirty-six days after the perforation occurred; and this author adds, "it is difficult to give an account of the circumstances which produce this difference, and it is in vain to seek for the explanation in the greater or less strength of the patients at the time that the accident took place." (*Louis*, op. cit.)

The only question, then, which the prognosis admits of is, whether recovery in pneumothorax from perforation by tubercle is barely possible. Laennec, arguing from his observation of the cicatrisation of tubercular cavities, is of opinion that it must not be regarded as impossible even in the severest cases. This opinion is shared by some others, but it is to be regretted that the few facts which are produced in its favour are drawn from the older writers, who were ignorant of its production in this manner. Some of them were evidently, at first, cases of empyema, which, by opening into the lung, gave rise to the pneumothorax: and we believe that most pathologists consider even the case related by Laennec, in which the pneumothorax existed for six years, was of this nature. But the progress of a case detailed in the third number of the Dublin Journal of Medical and Chemical Science (which has been more than once adverted to in this article) has induced us to believe that this case of Laennec and some others may probably have resulted from tubercular perforation, and to adopt his opinion as to the possibility of recovery. In this case the individual lived a year and a half after the establishment of the fistula, during which period the dilated side became contracted, but ultimately resumed its former dilatation. The patient's general health and strength became so much improved as to permit him to work as a bricklayer for some months of this period, but this labour exhausted him very much. His own imprudent perseverance in working under exposure produced an attack of severe and general pleuropneumony in the opposite side, which his extraordinary vigour enabled him to outlive, but he ultimately sank under the effects of repeated acute inflammation of the other lung as well as of the pneumothorax sac. The other medical men who saw it with the author agreed with him in thinking that this case might have lasted for a very long time; in fact that the contraction of the side, the improvement of health, and the disappearance of the tintement metallique indicated a spontaneous attempt at cure which was counteracted by the reckless neglect of proper caution on the part of the patient. The contemplation of this case, with some observations suggested by it, has, as we have said, induced us to admit the possibility of recovery, which, however, we by no means wish to inculcate in a positive manner: before this can be done by any one, a more enlarged experience must be possessed, and the observer, who is desirous of deciding the question by facts, has to set out with the melancholy knowledge that not one case proved by auscultation to have been of this nature is on record in which ultimate recovery took place.*

* For our opinion, as above stated, we have not adduced arguments where facts are wanting; but a consideration which weighed with us much, suggested by the above case, may be mentioned here. If the first effects of the perforation be outlived, (which is rare,) it does not appear that a worse condition exists in pneumothorax than in empyema, *provided the opposite lung remains free from tubercles.* It may be objected that there remains the tubercular state of the compressed lung. It is true; but we believe that the conditions which make tubercles so fatally progressive in the lung are absent in the latter; we allude to its constant motion and its great supply of blood. The motion and consequent friction which the act of respiration constantly maintains around a tubercle, appear to us to be a principal cause of the irritation which it produces, and consequently of the increase of its own bulk. Developed

The resources of the healing art, it will be anticipated, can contribute little of a positive nature, if any thing, to promote a cure in this calamitous affection. Yet, as in all such extremities the aid of the medical man will be eagerly sought, he should be prepared to do something, although he may regard it as ultimately certain to triumph over human efforts. Few cases will present themselves where some symptoms which aggravate the patient's sufferings may not be removed or alleviated by appropriate means. Proud science may draw back from what seems to be beyond her realm, but the physician has higher instincts to obey and duties to perform here as in other hopeless diseases, in attempting even the mitigation of the pain and anguish which science informs him he cannot altogether remove; and this reflection may be added, that where such motives actuate him to exertion, he is seldom left entirely without means, and never without the satisfaction which obedience to them brings.

We would consider, then, whether any thing can be done to allay the urgency of the symptoms by which the patient is so usually oppressed immediately on the occurrence of this species of pneumothorax; the dreadful dyspnœa, sinking, and pain. We find on this subject no assistance from books, for as the affection itself has been but recently clearly understood, its detection at this early period has been extremely rare; and this, we think, should suggest to all practitioners having the care of phthisical individuals, the utility of keeping in mind their liability to this event, in order to be able to afford assistance with promptitude should it occur. The indications for practice appear to be sufficiently clear. If it has supervened in the last stage of phthisis, when the patient is much emaciated, and already nearly spent by hectic, the treatment must be little energetic. Leeches should be applied in small number to the part where the pleuritic pain is most acute. Afterwards a fomentation of strong decoction of poppy heads, or an anodyne poultice should be used, and in twelve hours another application of leeches might be had recourse to with advantage. The exhibition of a strong narcotic internally will also tend to relieve the dyspnœa as well as the pain, for this class of medicines has the power of diminishing the sensation of want of respiration as well as of lulling the general sensibility of the brain. The use of anodynes may have probably been habitual with the patient before this occurrence, and in this case the usual dose should be increased. We need not specify the particular preparation, but may mention that the "acetum opii" and the "black drop" are often preferred by phthisical patients, and that it is prudent to vary by times from one preparation to another, by which means narcotics do not lose their effect so soon, when the dose is not augmented. If the individual be yet in the very early stages before the perforation, then it would appear to be a very rational proceeding to bleed him copiously, and to treat him with an especial regard to the pleuritis, which speedily ensues. A large bleeding seems to be a very proper measure in such a case for the purpose of diminishing the mass of blood in the circulation; by this means the opposite lung will be less oppressed by the additional influx which takes place from the compressed side;* and this might be confidently expected to alleviate the aggravated dyspnœa of which the latter condition is a principal cause. The leeches can be used here in large number, and the anodyne will follow the bleeding with great propriety, co-operating to the same effect. An assiduous application of these remedies, and watching their effects, might do much to relieve the urgency of these symptoms, which, if they be not by some means arrested, grow hourly worse.

But cases will occur where these means will be insufficient to prevent the dyspnœa from increasing to such a pitch as to threaten imminent suffocation, and then the operation of paracentesis is the only resource by which a longer space may be added to the life of the patient. The escape of the air effected by this means is almost always followed by great relief of the symptoms, abatement of the dyspnœa, and lowering of the pulse. This is only temporary. After a period, which is seldom long, although different in each case, the patient sinks, being only saved from suffocation to die of the consequences of the operation. It is, however, justified in such extreme cases by the prolongation of life which it effects, and the alleviation of that most distressing of all suffering which results from extreme dyspnœa.

In such a case, where the only question is whether life shall be allowed to be extinguished, the medical man has no alternative to balance; but if the urgent dyspnœa and pleuritic symptoms have already passed over without destroying the patient, and the case has attained a certain degree of chronicity, is paracentesis advisable? This question is at once set at rest if the existence of tubercles be proved in the other lung, as in such a case not a shadow of hope could be entertained of its success. Since Munro and Hewson advised the operation, it has been occasionally advocated without discriminating between the varieties of pneumothorax; but although the latter of these writers made a sharp conjecture on the subject, it is evident that neither of them had any adequate notions as to that species of which we treat. The chief, if not the only authority by which its performance in pneumothorax from such an internal cause can be supported, is a passage in Riolan, and the case in which Munro advised it. On referring to the former it is impossible to form an idea of what species of it his observations include;

in organs whose function does not submit them to motion or friction, their progress is incomparably slower than in the lung. Moreover, the great quantity of blood which circulates in this organ, probably contributes to its rapid progression. We would now observe, that in the lung compressed by pneumothorax, the influence of these causes is absent, as it lies against the spine in a state of nearly perfect quiescence, and of comparative anæmia. We would remark, also, that in the above case the hectic sweats ceased almost entirely from the time of the perforation, and we refer to its dissection for some particulars of the compressed lung.

* We find this argument used by Andral in recommending copious bleedings in the case of pleuritic effusion. "Lorsque l'épanchement existe, on doit encore avoir recours hardiment aux saignées, dans le double but de s'opposer aux progrès ultérieurs de l'inflammation, et de diminuer la quantité du sang, qui dans un temps donné doit traverser le poumon comprimé." Clin. Méd. t. ii. p. 582.

but it is very plain that he speaks only of the present relief which paracentesis procured, and not of the ultimate consequences. The following are his words: "Interdum flatus tam violenter distendit pulmones, ut præfocationem, adferat, ni succurratur aperto thorace per ipsam paracentesim, quod sæpius factitatum *Parisiis*, magno ægrorum emolumento, et thoracis levatione, etiamsi aquæ nullæ effluxerunt, sed flatus cum violentiâ displosus." (Riolan, Encheiridion Anatomicum. Lib. iii. cap. 2.—Med. Obs. & Enq. p. 394.) Monro's case, in which the operation was successful, is recorded with considerable accuracy; and we think that any one conversant with those matters, who examines it, will at once deny that it belongs to this class; it seemed, in fact, very probable that the air escaped into the chest by the rupture of some of these distended subpleural vesicles, which are not uncommon in emphysema of the lung, under which apparently the patient laboured for many years. (See Halliday on Emphysema, p. 49.) Universal experience of its failure, as well as the great weight of authority, is against the operation; for no case has recovered after it, of this variety of pneumothorax, since it has been possible to recognise it by auscultation. Its failure appears to have for its cause the readiness to take on a bad inflammation, which the false membrane and pleura possess in this species, in consequence of which it is very common to find a gangrenous state of these membranes occurring after the wound, propagated originally from its edges. Notwithstanding its not having succeeded hitherto, there is still a decided leaning to perform the operation whenever a case occurs. This in some measure is caused by the fact, that the old ideas which connected fluctuation and simple empyema are not yet perfectly exploded, and partly from the too generally applied notion, "melius est anceps experiri quam nullum,"—an adage which is sometimes erroneous, and founded on a forgetfulness of the part which nature takes in the removal of morbid action. The writer confesses it to be his own opinion that the possibility of cure which he has above professed to believe in, lies not in the appliances of art, but in the operations of nature.*

This terminates the subject of pneumothorax from perforation of the lung by a tubercular abscess. We have purposely devoted the bulk of this article to the consideration of this one species for the convenience of arrangement, as well as because it is incomparably more frequent than the whole of the other varieties. To have discussed the latter separately would have involved us in a mass of tedious repetitions; and it seems certain that he who is acquainted with the species which we have chosen for its description, can be at no loss fully to comprehend its pathology and diagnosis, should he meet with it arising from other sources; or at least we trust that the foregoing account of it will place him in such a position that he will be enabled to investigate them for himself. In conclusion, we shall now briefly mention the other methods by which authors have described it to arise.

Pneumothorax from gaseous secretion of the pleura.—The pleura, according to Laennec, in very rare cases takes on the secretion of air like the other serous membranes. This may take place singly, or the elastic fluid may accompany an aqueous or puriform effusion. This variety has not been decidedly established by the observation of other pathologists since the time of Laennec, and we record its existence merely on his authority, and on that of Andral, who relates a case of it, in which, however, this origin was not unquestionably proved. (Clinique Méd. t. ii. p. 512.)

Pneumothorax from the opening of an empyema into the lung.—The bursting of an empyema into the lung is not a very unfrequent occurrence; and yet this is an extremely rare source of pneumothorax. When it takes its origin in this way, the empyema has generally been circumscribed. This variety of pneumothorax is that in which the operation is fairly entertained (See Empyema); and we believe that the cases which recovered after it, where it was proved by the fluctuation to have existed, must be referred to it. We allude to the remarkable cases of Dr. Archer (Trans. Dublin Association) and Dr. Hawthorne, (Edinb. Med. and Surg. Journal, No. 61,) &c.

Pneumothorax from gangrenous perforation, and from rupture of the pleura in emphysema of the lung.—The first of these cases has been occasionally remarked, but the latter is extremely rare. Monro's case of successful operation was, as we have before stated, very probably of this nature. In it the rupture took place during a fit of coughing, and it was succeeded by general emphysema of the cellular tissue as well as pneumothorax. Laennec thought that he observed its origin from this cause in one case.

Pneumothorax from lesions of the thoracic parietes.—We should mention under this head, 1st, that consequent on penetrating wounds and lacerations of the lung by fractured ribs, called hitherto by surgeons emphysema thoracis. Dr. Hennen remarks that the fears which exist as to its arising from these causes are greatly exaggerated, as it is in fact a very rare occurrence in military surgery. (Hennen's Military Surgery, third edition, p. 380.) 2nd. Where it is consequent on the opening of an anthrax or abscess through the intercostal spaces. Of the former we witnessed an interesting case in the Meath Hospital, in which all the phenomena were remarkably perfect. To the latter belongs the singular case described by Dr. Duncan, in which a diffuse abscess spread from the arm to the chest, and penetrated the costal pleura and lung, upon which a circumscribed pneumothorax formed, communicating with the external abscess, and producing elastic tumours on the side. (Trans. Med. Chirurg. Society of Edinb.) 3rd. The species which succeeds to the evacuation of the purulent matter after the operation of empyema. This is an invariable consequence, but we believe that its prejudicial effects are too much insisted upon, as patients sometimes live many years with a fistulous opening in the side, and enjoy a tolerable state of

* If ever the perfecting of diagnosis shall arrive at distinguishing the cases where pneumothorax is caused by the bursting of a single tubercle, or of a small mass, we conceive that in such a case the operation may be yet practised with success.

health. The case of longest duration which we are aware of is that related by Dr. Otto, in which the individual daily discharged a small quantity of purulent matter through the aperture formed by the operation for seventeen years, and was enabled for nearly that period to take part in social life. (Acta Nova Reg. Soc. Med. Havniensis, vol. vii. p. 79.)

JAMES HOUGHTON.

POISONING.—See TOXICOLOGY.

POLYPUS OF THE UTERUS.—See UTERUS, DISEASES OF.

PORRIGO.—Porrigo is the generic appellation for several pustular diseases affecting the scalp chiefly, but occasionally other parts of the body, agreeing less in their symptoms than the species of almost any other of the genera of cutaneous diseases in the classifications of writers. It is synonymous with the *tinea* of Avicenna and various authors.

Porrigo is defined by Bateman, "an eruption of straw-coloured pustules, concreting into yellow or brownish crusts or cellular scabs;" but this definition accords with three only of the species usually arranged in this genus; and, indeed, the genus actually comprehends three diseased states of skin, differing not only in their symptoms, but requiring distinct modes of treatment. But as little advantage perhaps would be derived from an alteration of arrangement, or the division of this genus into three distinct genera, we propose to arrange the species so as to bring together those that accord, and separate others the characters of which are evidently distinct. They may be all arranged under the three following sections.

SECT. I. PORRIGO, *true porriginous eruption*, comprehending—

Species 1. *P. larvalis;*
2. *P. lupinosa;*
3. *P. favosa.*

II. ECZEMATOUS PORRIGO.
4. *P. furfurans.*

III. ANOMALOUS PORRIGO.
5. *P. scutulata;*
6. *P. decalvans.*

I. **True Porriginous Eruptions.** — These are characterized by the pustules assuming those forms which have been denominated *favus* and *achor*, and by being unaccompanied with fever. The different forms may be regarded rather as varieties than distinct species, as they sometimes exist simultaneously on the same person. They affect both sexes and all ages, but are most frequently observed in infancy and youth. In many instances it is difficult to trace them to any peculiar predisposition; but in general they may be referred to some deranged condition of the digestive organs, to improper food, and occasionally to depressing passions. None of the true porriginous eruptions are contagious, nor does the treatment applicable to all of them materially differ.

Species 1. *Porrigo larvalis; milk scall or crust.*—This species of porrigo appears on the forehead or cheeks, in the form of small, yellowish, white, superficial pustules, upon a red surface, in irregular groups. On breaking, they pour out a greenish-yellow fluid, which concretes into thin lamellated scabs, usually of a brownish hue. New groups of pustules form in the vicinity of those that have broken; these break, and, as the former, pour out their fluid, which encrusts in its turn; whilst the old scabs are thickened and extended by the fluid continuing to ooze out from below them, so that by degrees the whole of the face becomes covered by these scabs, as if with a mask; thence the specific term *larvalis*. At this time the crusts exhale a rank peculiar odour, which Alibert likens to sour putrid milk. The eruption varies in severity: sometimes the inflammation is intense, the exuded humour very abundant, and so acrid as to excoriate the cheeks and other parts; at other times it is moderate in quantity and mild in quality; the pustules are few, slow, and successive in their development, and the crusts thin and dry. Besides the forehead and cheeks, patches appear behind the ears, around the mouth, and upon the chin, yet they rarely appear upon the nose and eyebrows. Small patches occasionally break out about the neck and breast, and sometimes even on the extremities. When they rise upon the hairy scalp they assume a chronic character; the bulbs of the hairs sometimes inflame, and baldness, temporary or permanent, may be the result. In whatever part the eruption is seated, it is accompanied with itching, sometimes with stinging pains, which are more severe, the younger the patient is, and in infants not only greatly disturb the natural sleep, but derange the digestive function. This is particularly the case in plethoric children, and especially when the eruption spreads over much of the neck and breast. The eyes and eyelids are often inflamed, and discharge a purulent matter; when the discharge on the scalp is absorbed, the parotid glands swell. In strumous and highly irritable subjects the mesenteric glands also inflame, and marasmus, diarrhœa, and hectic may supervene and destroy the patient. But this aggravation of the disease is a rare occurrence.

When the disease is yielding, whether spontaneously or to remedies, the pustules form more slowly, exude less, and the crusts fall off and are not renewed, but they leave behind them a red, tender cuticle, which is sometimes marked with deep lines, and occasionally exfoliates several times. Sometimes it appears as if about to yield, and then returns with greater severity. In this manner we have seen it vary during the whole period of dentition, and yet, unless the nails have been much at work, no cicatrices remain.

This species of porrigo is not contagious; but in a case mentioned by Alibert, in which an infant was inoculated with it, the disease was taken. It occurs in infants during the cutting of the first teeth, and also in children during the second dentition. We have never been able to trace it to any state of the breast milk when it appears in infants, but in every instance the stomach is in a very irritable state, and much acid is present in it. We have been able to trace it to the too free use of accescent food, such as fruit-tarts and puddings, sugar, and various articles of confectionary into which it enters, in children of full and gross habits of body. Rayer says that it is less frequent in the Parisian hospitals than the porrigo *favosa*, the proportion being as seventy-one to nine hundred and eight.

The disease most likely to be confounded with

porrigo *larvalis* is porrigo *favosa;* but to careful observers the circular depressed crusts of the latter readily distinguish it from the former. None of the other species of porrigo, except porrigo *furfurans*, is likely to be mistaken for it; but in porrigo *furfurans* the crusts dry and become very hard and greyish, which distinguish it.

In general the disease runs its course without danger, but, as we have already stated, the mesenteric glands may be in a diseased condition, in which case it becomes formidable, and may induce diarrhœa, marasmus, hectic, and thus prove fatal. The sudden cessation or repulsion of the discharge is also said to indicate an increase of some deeper-seated disease; but our experience has not led us to form such a conclusion. We concur in the opinion of Dr. Underwood, (Treatise on the Diseases of Children, 8th edit.,) that infants who suffer much from the milk crust are always healthy in other respects, and cut their teeth remarkably well. Dr. Starck (Starck's Diss. de Crusta Lactea Infantum, &c.) affirms that the prognosis is always favourable when the odour of the urine resembles that of the cat. We have not seen this remark verified; indeed, unless the disease occur in very young, ill-fed, and badly nursed children, or in those of an hereditary strumous constitution, our prognosis may always be favourable.

Porrigo *larvalis* requires both constitutional and local treatment.

When the disease appears in infants at the breast or during the first dentition, it is essential to allay the general irritability of the mucous membrane, which is the source of the acescent state of the stomach; and as soon as that is accomplished, to aid the general powers of the system by mild tonics. For answering the first of these indications we have seen much benefit derived from the hydrargyrum cum creta, in doses of gr. iii. to gr. vi. given night and morning; or in older children, when the mesenteric glands were enlarged, and the abdomen was tense and tumid, from calomel, in doses of one-tenth of a grain combined with one-fourth of a grain of ipecacuanha and half a grain of the powder of conium, given every eighth hour for a week. For fulfilling the second nothing answers so well as a combination of carbonate of soda, powder of calumba, and rhubarb, in doses proportioned to the age of the child and other circumstances, given twice or three times a day. Under such a plan of constitutional treatment we have witnessed the disease to yield in a very short time without any local applications except those which cleanliness requires. We have had no occasion to employ sarsaparilla, cinchona bark, the rumex *aquaticus*, nor the viola *tricolor* recommended by Dr. Starck. (Ibid.) During dentition the warm bath at bedtime is highly salutary, especially when the itching is so troublesome as to interrupt the sleep of the little patient. Nothing is more important than to examine the state of the milk: if this be thick, the nurse should either be changed, or her allowance of porter, animal food, and other stimulant nutriment should be diminished. If the infant be undergoing the uncertain experiment of being brought up by hand, the food should consist solely of milk diluted with an equal quantity of barley-gruel, and sweetened slightly with lump sugar. The quantity should be moderate, and any thing like voracious appetite in the child repressed.

In children of more advanced age, during the second dentition, when the pulse is quick and full, the face flushed, and the nights restless, it may be necessary to apply a few leeches either behind the ears or under the angle of the jaw; and in very obstinate cases to apply a blister on the nape of the neck, or between the shoulders, and keep it discharging for ten or twelve days. Gentle aperients, merely to regulate the bowels, are necessary, but we have never seen any advantage derived from a course of purging.

With regard to local applications, if the eruption occupy the scalp, it is scarcely requisite to say that the hair must be removed by scissors, for it seldom admits of being shaved; after which the separation of the crusts should be aided by a dressing of the oxide of zinc or the subacetate of lead-ointment on lint, covered with an emollient poultice. If the discharge be considerable and very acrid, the denuded surface should be washed with a solution of ʒii. of bicarbonate of soda in *f.*ʒviii. of bitter almond emulsion, or of milk with the addition of *f.*ʒss of hydrocyanic acid. In very young children, however, it is advisable to leave out the hydrocyanic acid. As soon as the local irritation is subdued, if a return to the healthy state of the scalp seems to be retarded only by the crusts becoming dry, hard, and adherent, their separation and cicatrization are facilitated by the unguentum hydrargyri nitratis, diluted with six or seven parts of lard. We have never met with a case in which lotions of the hydro-sulphuret of potassa or sulphureous baths were required.

In conclusion we may remark that we are acquainted with no eruptive disease in which there is so complete an obliteration of every thing that could indicate the existence of the previous eruption after the crusts fall; and in none have we perceived less mischief to result from checking the eruption.

2. *Porrigo lupinosa; lupine scall.*—This species of porrigo is distinguished by the *achores*, which arise in small separate clusters, forming when they break circular scabs of a yellowish white colour, set deeply in the skin, with a central indentation or depression, sometimes containing a white, scaly powder. When seated on the scalp or on the temples, they acquire nearly the size of a sixpence, and there is sometimes an intervening thin white incrustation, which exfoliates, or occasionally forms an elevated crustaceous covering. The eruption sometimes displays itself on the shoulders, the thorax, the abdomen, and the extremities; but in these places the scabs never attain to the size which they do on the scalp. The eruption exhales an offensive odour, not unlike that of mice; it affords a harbour for pediculi in the crevices of the crusts; and when the acrid discharge is absorbed, the cervical glands swell; whilst long-protracted cases terminate in baldness. When left to itself, the disease is very long before it wears itself out, and even under proper treatment it is tedious of cure.

It is not contagious; and it is the least frequent

of all the species of porrigo. Its predisposing cause seems to be a low state of the habit, resulting from the miseries attendant on poverty.

The treatment of porrigo *lupinosa* consists chiefly in the application of emollient poultices, and soap and warm water; the mechanical removal of the crusts; and, after this is effected, the assiduous use of an ointment made with two drachms of the finely powdered seeds of the cocculus Indicus and one ounce of lard. In very obstinate cases, the hard crusts may be touched with diluted sulphuric or muriatic acid, or treated with a lotion made with *liquoris potassæ* ℥j, *olivæ olei* ℥ij, *aquæ* ℥j. When the crusts are removed, and the surface appears red and covered with numerous small ulcers, exuding a viscid, fetid, yellowish fluid, the diluted ointment of the nitrate of mercury is the best application to assist cicatrization, and complete the cure.

3. *Porrigo favosa; honeycomb scall.*—The eruption in this species of porrigo consists of small, flat, soft, straw-coloured pustules, termed *favi*, generally distinct, with an irregular edge, and bounded by a slight inflammation. The scalp is the chief seat of the eruption, but it sometimes occupies the forehead, the temples, the chin, the space behind the ears, the eyebrows, and occasionally it extends to the trunk and the extremities. When it appears on the scalp, the pustules are small, not very distinct to the naked eye, and the minute drop of yellow fluid which they contain does not escape, but dries within them, and acquires a deeper yellow colour, and is very adherent. The pustules, although they are usually distinct, sometimes appear in groups, and become confluent. When distinct, they are usually on elevated bases, and each is frequently traversed by a hair. In whatever manner they appear, they are always more or less accompanied with itching. If the crusts be removed by poultices, or by any lotion, they do not return, the formation of new pustules being necessary for that purpose. When the disease is left to itself the crusts are very adhesive, and remain in a dry, white, and brittle state, sometimes for months and even years. Sometimes as they assume this character in one place, fresh pustules appear in another. The hair separates with the greatest ease, sometimes leaving the part permanently bald. As the disease proceeds, if great care be not taken to keep the parts clean, pediculi harbour in the crusts, the itching augments to an intolerable degree, and the eruption exhales a most offensive odour. The excoriated surfaces, after the crusts are removed, exude a fetid reddish fluid, which concretes into irregular crusts. Occasionally they cause small subcutaneous abscesses and lymphatic swellings in the neck, which slowly suppurate; the axillary glands are affected when the eruption appears on the upper part of the trunk.

It is probable that the reticular tissue is the seat of the disease; although, owing to the bulbs of the hair becoming affected in long-standing cases, it has been supposed to originate there. It rarely happens that the hairs are detached without being diseased. The duration of the disease is uncertain.

Porrigo *favosa* is asserted to be contagious; because, owing to the acrimony of the discharge, it causes inflammation and scabbing on any sound part with which a diseased part comes in contact; as for instance the breast with the chin, or the hands and arms with the face in young children. The breast of the nurse may become affected in the same manner. It occurs at all seasons of the year, and in both sexes; but it is more common in infancy and childhood. The strumous diathesis, bad nourishment and poor clothing; damp, ill-ventilated houses, prisons, and the miseries of poverty in all their forms, may be regarded as its predisposing causes.

This species of porrigo may be readily confounded with porrigo *furfurans;* but as the pustules are found on different parts of the body in every stage of their progress, it is easily recognized. When the disease is of long standing, the hairs are destroyed on the affected parts of the scalp.

[It has been affirmed of late that the yellow substance, which constitutes the crusts of this affection, is an organic growth of simple structure bearing a marked resemblance to the vegetable bodies, collectively called *mould.* They have been examined by Remak, Schönlein, Fuchs, and Langenbeck, and Gruby, the last of whom states, that the crusts are made up of aggregated *mycodermata.* It is very questionable, however, whether these mycodermata be really vegetable; and it is certainly far more probable, that they are very simple animal growths.—(E. Wilson, *on Diseases of the Skin,* Amer. edit. p. 322, Philad. 1843.)]

Continental writers assert that porrigo favosa requires little more than local remedies; but we have seen no case of the disease in which it was not easy to trace it to some morbid condition of the system. For this reason a gentle alterative course is required, care being taken at the same time to regulate the diet and exercise. The former should consist chiefly of light animal food, with milk and farinaceous preparations; the latter should be regular, but never carried to fatigue; and when the tepid bath can be employed, which is always more or less serviceable, the exercise, in dry and temperate weather, should be taken immediately after using it. If the habit be decidedly strumous, the glandular affections severe, and much emaciation has taken place, tonics will be found to be necessary. The chalybeates are the most useful, and none possesses more power in such cases than the hydriodate of iron, given in doses of from one grain to three grains in a large quantity of water three times a day. The sulphate of quinia and the muriate of baryta have also been advantageously administered. In young children we have seen much benefit derived from the hydrargyrum cum creta, given every night in doses proportionate to the age of the patient; with a combination of cascarilla and subcarbonate of soda, in full doses, given three times a day. In adults a mild course of Plummer's pill with sarsaparilla is occasionally requisite, in cases of long standing which have resisted the usual mode of treatment.

With respect to local remedies, the first object is to free the scalp as much as possible from the crusts, and to subdue topical inflammation. This is accomplished by cutting the hair as short as

possible, or by shaving the scalp if the eruption admit of it; daily ablution with hot water and soap; and when the crusts are dry and very adhesive, the application of poultices. After the surface is pretty well cleared, an ointment containing equal quantities of the unguentum oxidi zinci and unguentum hydrargyri precipitati albi may be applied to the inflamed parts; or if the inflammation be moderate, the unguentum hydrargyri nitratis will answer better. The combination of the tar ointment, diluted with two parts of lard, and one part of sulphur, forms a useful application when the crusts are very adhesive; but the pitch-cap, which was formerly much employed, is apt to excite a highly inflammatory state of the scalp, and a considerable degree of symptomatic fever, consequently it should be used with caution. In addition to these topical applications, much advantage has been derived from the introduction of a seton in the nape of the neck or in the arm; indeed we have rarely witnessed the most obstinate cases resist the beneficial influence of such a drain continued for a month or six weeks.

Of all the local methods of treatment, that pursued by two brothers of the name of Mahon, in the Parisian hospitals, has been found the most efficacious; and therefore we shall give a brief sketch of it. The hair is first cut, so as to leave it throughout about two inches long; the crusts are next cleared away as completely as can be done by the aid of linseed-meal poultices and soap and water, a part of the treatment which occupies from four to five days. Having thus prepared the scalp, the affected parts are next covered with an ointment composed of chalk, silex, alum, oxide of iron, a small quantity of subcarbonate of potassa, some lime, and a little charcoal rubbed up with lard, but in proportions which are kept secret. This ointment is applied on alternate days for upwards of a month; whilst on the intermediate days a comb is passed gently over the parts to detach the loosened hairs with as little pain as possible. At the end of this time a powder, the same as that which was employed in forming the ointment, but without any charcoal, is sprinkled over the affected parts; and after using the comb on the following day, the former ointment is again resorted to; and by continuing this method the disease yields, and the skin again acquires its natural and healthy condition. We have had no experience of this method of treating this species of porrigo; but from its reputation in Paris we are of opinion that it merits the attention of British practitioners.

Many other local stimulants have been employed with various success; for example, ointments composed of powdered charcoal, peroxide of manganese, and oxygenated lard; cantharides ointment, and pommades made with white precipitate, or calomel, or bichloride of mercury. Different anodyne cataplasms also have been recommended, made chiefly with strong decoctions of conium *maculatum* or of the twigs of dulcamara; but at best these may be regarded simply as palliatives to allay local irritation. In obstinate cases, after removing the crusts, it has been found useful to touch the raw surfaces with a feather dipped in any of the mineral acids, and then a few minutes afterwards to bathe the parts repeatedly with cold water. The pain excited is great; consequently some degree of caution is requisite in applying these caustics to children of delicate habits.

When the eruption appears on the trunk of the body, the ordinary warm-bath is found to be beneficial, and still more so the sulphurous vapour-bath.

[Alkaline ointments and washes; weak solutions of chlorinated lime or chlorinated soda or of creasote may be employed; and in some cases, solutions of sulphate of zinc or of sulphate of copper or of nitrate of silver have been of great service. The citrine ointment, unmodified, or re-reduced, according to circumstances, has been advised by many. In the author's experience more good has been derived from the ointment of iodide of sulphur than from any other application. Cod-liver oil is likewise said to have been used with advantage; but it would be endless to enumerate all the topical applications that have been advised. (For a further detail see the author's *Practice of Medicine*, 2d edit. ii. 126.)]

In conclusion, it is necessary to recollect that in no cutaneous eruption is a change of measures more necessary than in this species of porrigo; the employment of any single remedy, however judicious, is not likely to be followed by success.

II. **Eczematous Porrigo.**—*Species* 4. *Porrigo furfurans; furfuraceous scall.*—This is the teigne *amiantacée* and teigne *furfuracée* of Alibert; the eczema *de cuir chevelu* of Biett, Rayer, and some other French writers: but as there can be only one opinion as to its pustular nature, it cannot be regarded as a variety of eczema, although it may be characterized as an eczematous porrigo. The eruption most commonly appears on the nape of the neck, at the margin of the hairy scalp, or on the temples. It commences with a crop of minute achores, the pus in which being unusually transparent has led them to be mistaken for vesicles. The discharge is moderate, and soon concretes, forming thin, laminated, exfoliating scales, accompanied with much itching and soreness when the disease, as is most commonly the case, is seated in the scalp and extends to the temples, ears, and neck. The discharge is also viscid, and exhales a nauseous odour; it adheres to the hairs; and on drying forms a powdery scurf, which the slightest friction separates; and when confined under these scales, it is absorbed, and the glands of the neck swell and become painful. This also occurs in old cases; whilst the inflammation extending to the bulbs of the hairs, these fall off and baldness appears.

This species of porrigo generally attacks adults, females rather than males, and always those of a lymphatic temperament. The eruptions with which it is most likely to be confounded are psoriasis, and lepra when the latter affects the scalp. We have seen it also assume the appearance of impetigo. The pustular origin of the disease, as it appears at irregular periods, enables us very readily to form a correct diagnosis; and independent of this, we observe no moisture nor ulceration, nor any diseased condition of the hair in either psoriasis or lepra; nor are these eruptions conta-

gious, whilst porrigo *furfurans* is undoubtedly communicable by contact.

Porrigo *furfurans* is usually treated solely by topical remedies; but we have never seen it yield without the employment of general means. We have found much benefit by prefacing a light alterative course, with one or two moderate bleedings, and a full evacuation of the alimentary canal by means of six or eight grains of calomel, followed by a brisk saline purgative. We then generally order ten grains of hydrargyrum cum creta to be taken daily at bed-time, and twenty minims of liquor potassæ three times a day, gradually increasing the dose until it reach to ninety or one hundred drops. The best vehicle is milk, which both covers the taste and sheaths the acrimony of the medicine in swallowing. We have occasionally carried the dose to the extent of one hundred and twenty minims without any inconvenience to the patient.

With respect to the local treatment, the first object is to free the scalp and the hairs from the scurf, which is easily accomplished by cutting the hair short, and using a solution of f.ʒiv of liquor potassæ, in f.ʒvss of bitter almond emulsion as a lotion. The same lotion, more largely diluted, may be applied, tepid, twice a day: it cleans the scalp better than soap and water, and prepares it for the application of a stimulant ointment, which should be kept on, and the surface at the same time preserved in a moist state by an oil-silk cap accurately fitted to the shape of the head. The nature of the ointment must depend upon the greater or less irritability of the affected surface. When the scalp is very tender and moist, the oxide of zinc ointment should be preferred; or an ointment prepared with two parts of finely powdered cocculus indicus and eight of lard. In a drier and less sensitive condition of the diseased parts, the strong lotion may be used daily, or one composed of ʒiij of recently prepared sulphuret of potassæ, ʒi of soft soap, ʒviij of lime water, and ʒij of rectified spirit; or with a lather formed with equal parts of soft soap and sulphur ointment in hot water. Instead of the unguentum oxidi zinci, either the unguentum hydrargyri nitratis, or unguentum hydrargyri nitrico-oxydi, or unguentum acidi nitrici of the Edinburgh Pharmacopœia may be now used; or, what in our opinion is preferable to all of these, a mixture of the common tar and sulphur ointments. By the employment of such means the disease usually yields, but as the inflammatory symptoms frequently recur, it is necessary, under such circumstances, to return to the use of the milder applications. All salted meats, pork, and fish should be forbidden during the existence of the eruption.

III. **Anomalous Porrigo.**—This division of porrigo contains chronic inflammatory affections, of a contagious nature, characterized by extremely minute circular groups of achores, which exude a fluid that concretes into thin, slightly adhesive crusts. In one of these species both the achores and the crusts are so minute as to be almost microscopic objects.

Species 5. *Porrigo scutulata; ring-worm of the scalp.* This is the most difficult to manage, and the most decidedly contagious of the whole genus. The pustules, or achores, are generally scated on the scalp, although occasionally they appear on the forehead and neck in distinct, somewhat distant, circular patches. When these are closely examined with a magnifying glass, they are found to consist of very minute whitish-yellow pustules, embedded as it were in the epidermis. These break and are succeeded by thin crusts, which are readily detached at first, but after a short time harden, and become adhesive as they accumulate. The first circular patch, after the pustules break, is in a few days surrounded by a circle of fresh pustules, which break and crust in their turn, and are surrounded by a new crop of pustules; and by these repetitions the areas of the patches extend, until the greater part of the scalp is covered by them. The pustules are generally preceded by erythematic patches, which itch: when carefully examined, M. Biett says that, like porrigo *favosa*, each pustule has a central depression, and is generally traversed by a hair; and when the crusts in which they terminate exfoliate, the surface remains red, shining, and inflamed. If the hair falls off, which generally occurs, the new hairs are dry, woolly, and so little adhesive that they may be detached with the smallest effort. The various patches display different periods of the eruption, and each is surrounded by an external circle of recent inflammatory pustules. The duration of the discase is very uncertain; but under every circumstance, even the most favourable, the prospect of cure is always a distant one. When the circles remain red, smooth, shining, dry, o scurfy, the disease is still in progress; but when the redness and exfoliation disappear together, and the hairs begin to cover the spots and assume their natural appearance and colour, it may be regarded on the decline.

With regard to the causes of this disease, it is said to originate spontaneously in weak, flabby children, badly nourished, and who are confined to close ill-ventilated apartments; but there is some reason for thinking that it is one of those evils which our oriental possessions has bestowed upon us, (for we think that it is imported from India,) and that its general propagation is due to its highly contagious character. Its introduction into a school is sufficient to fix it in the establishment for years, in spite of the greatest vigilance and attention on the part of the superintendents. It occasionally, but rarely, occurs in adults.

The circular form of the patches, their manner of extending, the minuteness of the achores, and their contagious nature, readily distinguish this species of eruption from all others. It may nevertheless be confounded with impetigo *figurata* when this appears on the hairy scalp; but there are distinctive characters sufficiently evident to separate the two: thus, the superficial, slightly prominent psydracious pustules of impetigo *figurata*, seated on a diffused red surface, differ essentially from the imbedded pustules of porrigo *scutulata*, surrounded by inflammation only at their base. Impetigo *figurata* also seldom appears exclusively upon the scalp, nor is it contagious.

If the spontaneous appearance of porrigo *scutulata* be true, it is evident that the tone and vigour of the constitution should be brought up where that is deficient; thence gentle alteratives, namely, minute doses of hydrargyrum cum creta, with

decoction of bark, or the solution of hydriodate of iron or other chalybeate preparations, are indicated when the disease appears in cachectic habits. When, on the contrary, it is communicated by contagion to stout and healthy children, no general treatment is required. In both, however, some attention to diet and regimen is necessary; all crude aliments, raw vegetables, and sweetmeats, or whatever is likely to prove accscent, should be avoided; and the surface of the body, particularly the lower extremities, must be kept warm, so as to maintain the balance of the circulation and keep up the insensible perspiration. In a word, every thing should be done to improve the general health if that is defective, and to preserve it if it do not require improvement.

The local treatment must be varied according to circumstances. In the early stage of the disease, when the patches are inflamed and irritable, soothing applications are indicated; for example, sponging with warm water, lime-water, or the application of emollient poultices, after shaving the head, which should be done at least once a-week; but we have seen more advantage derived from the simple application of cold or iced water to the patches, at this time, than from any warm or tepid application. A light linen cap should be worn, and changed daily, and every pains taken to preserve cleanliness, and to prevent scratching or any mechanical irritation of the scalp. As the inflammatory state diminishes, and a dry, harsh state of the patches ensues, provided no fresh circles of pustules rise, and produce tender, inflamed areolæ, stimulant applications are indicated. During the irritative stage, Alibert recommends a cataplasm of hemlock, which we have tried, as well as cataplasms of henbane and belladonna, without observing any decided benefit to follow their employment. The belladonna causes dilatation of the pupils, blindness, vertigo, and other nervous symptoms, and therefore it requires to be used with caution, especially in young subjects. If ointments are desirable at this period, those prepared with cocculus indicus, calomel, white precipitate, oxide of zinc, the acetates of lead, or with opium or tobacco, are chiefly recommended. Decoctions of poppy heads or of tobacco have also proved beneficial; but the latter requires more caution than the belladonna poultice. We have seen it cause sickness, vertigo, and the most alarming degree of collapse.

When the inflammatory state is absent, every stimulant that can be externally applied has been used in this complaint. Ointments, formed of metallic oxides and salts, namely, unguentum hydrargyri nitratis, unguentum hydrargyri nitrico-oxydi, and Banyer's ointment* containing calomel; sulphur ointments; the tar ointment, or one resembling it, made with petroleum instead of tar; ointments containing white hellebore, sabadilla, mustard, staves-acre, black pepper, capsicum, galls, rue, and similar vegetable excitants have been employed, and each in some cases has proved successful; nevertheless all have occasionally failed. In India, where the disease prevails, an ointment composed of ʒi. of powdered galls, ℈i. of sulphate of copper, and ʒi. of simple cerate is said to prove successful. In this country the last application in vogue is creasote;† we have witnessed its success, but experience has yet to determine how far it can be depended upon. In very dry, rigid, inert states of the patches, the nitrate of silver, the strong mineral acid, the pure alkalies, and other caustics have been applied, with the view of destroying the morbid cuticle and setting up a new action in the part. In some cases we have seen this practice succeed: in many instances, however, like other applications, it is useless. Although none of these external remedies when singly relied upon is permanently successful, yet all of them, when alternately employed or variously combined, are productive of benefit. As far as our own experience has enabled us to form a judgment on this subject, we are of opinion that more benefit is derived from the use of the depilatory method mentioned under the head of porrigo *favosa* than from any other mode of management. It is undoubted that, whether the disease be seated in the bulbs of the hairs, or whether these become mere irritating bodies, the removal of the hairs is an important step in forwarding the cure. When these are once removed, the application of any stimulant ointment, exciting a new action in the diseased spots, aids the cicatrization of the pustules, and the formation of a healthy cuticle. The best and most certain evidence of the cure being completed is the growth of healthy, good coloured hair on the spots which were previously the sites of the pustules.

Species 6. *Porrigo decalvans; bald scall.*—This species, which is easily recognised from all the other species, and indeed from every other cutaneous disease, is the area *alopecia* of Celsus, the alopecia *areata* of Sauvages, and the trichosis area of Good. (See Alopecia.) It is characterised by patches of baldness in different parts of the head, generally of a circular form, with the naked part of the scalp smooth, shining, and white. No crusts form on these patches, nor can any achores be detected even when a good eye is aided with the most powerful glasses. Sometimes the patches enlarge, and run into one another so as to produce baldness of the greater part of the scalp.

It is extremely difficult to trace the cause of this curious disease. It seems to be some morbid condidition of the secreting follicles of the hair, for

* Banyer's ointment consists of lb.ss of litharge, 2 oz. of burnt alum, 1 oz.ss of calomel, lb.ss of Venice turpentine and 2 lbs. of lard, well rubbed together. It is too acrid for all cases, consequently it requires dilution with more lard.

† As this substance has very lately been introduced to the notice of the profession in this country, it may be useful to give here some account of it. Creasote is a colourless transparent liquid; sometimes, however, it is of a pale yellow colour. Its specific gravity is 1·037. It remains fluid at —17° and boils at 397° Fahrenheit. It impresses a hot taste on the palate, followed by sweetness; its odour resembles that of Westphalia ham. The antiseptic properties of pyroligneous acid are ascribed to Creasote. It is soluble in eighty parts of water, and in every proportion in alcohol, ether, and naphtha. It combines with acids and alkalies, forming compounds soluble in water. It coagulates powerfully albumen. Finally, it is a compound of carbon, hydrogen, and oxygen.

Such are the physical and chemical properties of this substance. It operates as an energetic excitant to the animal system, and proves poisonous to fish when they are introduced into aqueous solutions of it. As a therapeutical agent, it rapidly exhausts nervous energy, and therefore displays a narcotic as well as an excitant influence. It has been administered internally in rheumatism, hysteria, and several other diseases, and it has certainly been found useful as a topical remedy in ulcers and several cutaneous diseases, but hitherto its administration has been directed rather by empirical than scientific principles.

there are no achores apparent, nor any disease of the cutis, unless we can regard the pale exsanguine aspect of the bald spot to be the result of some contracted state of the capillaries. There is a slight degree of itching, indicating nervous excitement on the patches; but this is not always present. Dr. Bateman (Synopsis, p. 248) hints that the disease is contagious: we have not seen any cases in which it could be traced to communication. It occurs most frequently in children of ten or twelve years of age; but it is also occasionally observed in adults.

With respect to the treatment of this species of porrigo, we have seldom failed to cure it by shaving to the extent of an inch round the bald patches, and brushing them, at least twice a day, with rectified oil of turpentine, diluted with two parts of alcohol. As the new hair begins to appear on the bald parts, it should be regularly shaved off as long as it is softer and of a lighter colour than the healthy hair of the individual, the re-appearance of which is the proof of the termination of the disease. No internal medicines are indicated.

A. T. Thomson.

PREGNANCY AND DELIVERY, SIGNS OF.—Few questions in legal medicine, whether considered in a merely professional point of view, or in reference to their relations with criminal or civil law, impose on the medical examiner a more delicate duty, or a more trying responsibility, than the determination of the existence or absence of pregnancy; placed before him, as the question generally is, under circumstances by which all its natural difficulties are increased an hundred fold. It usually happens in such cases that he cannot rely on a single statement made by the individual who may be the subject of examination; but, on the contrary, he must be prepared for every species of falsehood and misrepresentation. And yet on the correctness of his opinion frequently depend the claim to fair fame, virtue, and honour;—the succession to property, and the rights of legitimacy;—the judicious treatment of disease;—and, in criminal cases, the preservation or destruction of the unborn innocent.

The instances which present themselves are unfortunately but too frequent, in which the unmarried female, either yielding to the influence of passion, or made the reluctant victim of the unprincipled seducer, and becoming pregnant, an investigation as to her real state is sought for, in the hope of inducing marriage, or perhaps for the purpose of influencing a jury in the assessment of damages.

An attempt may be made to *conceal* pregnancy by the unmarried, or even by the married under certain circumstances; as in the case of a wife's separation from her husband or his casual absence, in order to avoid disgrace in society, or to enable her with impunity to destroy her offspring. On the other hand, pregnancy may be *feigned* in order to gratify the wishes of a husband or relatives, to extort money, to compel marriage, to deprive the lawful heir of his just rights of succession, or to delay the execution of the sentence of death.

By the law of this country, a woman condemned to death may plead pregnancy in bar of execution, and medical men are appointed to determine the question whether the culprit is really with child or not; and if she is, whether she be *quick with child*, for pregnancy alone will not save her. This rule, we may observe in passing, is one of the most monstrous and barbarous features of our penal code.* Infinitely superior both in morals and in mercy is the law of France, which ordains that if a woman be pregnant at all, she shall not be executed until after her delivery; and formerly the privilege allowed under such circumstances was even greater: in 1795 a law was passed which ordained that no woman accused of a capital crime should be *brought to trial* until it was properly ascertained *that she was not pregnant*, (see observations on *Quickening* in the present article,) and in conformity with this, several decisions were reversed where it appeared that the female had not been properly examined; and in more than one instance the sentence of death was annulled, because after the trial it was discovered that the woman was pregnant at the time of being put upon her trial. (*Fodéré*, Méd. Lég. vol. i. p. 428, et seq.)

Connected with such investigations, some very melancholy mistakes have occurred, by which the lives of unborn infants have been sacrificed. Riolan relates the history of a woman named Genevieve Supplice, who, after being hanged for robbery, was publicly dissected by him at the school of medicine, and was found pregnant of a child of five months, contrary to the opinion of the surgeons and midwives who had examined her. (Anthropog. lib. 6, ch. 2.) Mauriceau also mentions having seen at Paris, in 1666, a miserable example of this kind in a woman who was hanged and afterwards publicly dissected: she was found to be pregnant four months, notwithstanding the report of the persons who had visited and examined her by order of the judge before her execution, and pronounced that she was not pregnant, being deceived by the fact of her continuing to menstruate. This matter caused a great sensation of disgust and horror, and was reported to the king and his court, and in consequence a severe censure was passed on the persons who, by their ignorance, had caused the untimely execution of the unfortunate woman, with whom had perished also her infant, innocent of its mother's crime. (Maladies des femmes grosses, tom. i. p. 71-2.)

A proceeding may also take place at common law, "where a widow is suspected to feign herself with child in order to produce a supposititious heir to the estate, and defraud the lawful heir. In such case the heir presumptive may have a writ *de ventre inspiciendo*, to examine if she be with child or not, and if she be, to keep her under proper restraint until she is delivered. But if the widow be, upon due examination, found not pregnant, the presumptive heir shall be admitted to the inheritance, though liable to lose it again on the

* Pregnant women have always been objects of much regard and reverence. The Roman laws allowed them the same privilege as those of France. The ancients even spared the life of the murderer who took refuge under the roof of a woman with child. The kings of Persia used to present two pieces of gold to each pregnant woman. The Jews, who observed so rigorously the Mosaic law, allowed them the use of forbidden meats, lest the child might suffer from their longings.

birth of a child within forty weeks from the death of the husband." (*Blackstone*, vol. iv. p. 394-5.)

A celebrated case of this kind, which attracted great attention, occurred in the family of Sir Francis Willoughby, who died, seised of a large inheritance. He left five daughters, (one of whom was married to Percival Willoughby,) but not any son. His widow at the time of his death stated that she was with child by him. This declaration was evidently one of great moment to the daughters, since if a son should be born, all the five sisters would thereby lose the inheritance descended to them. Percival Willoughby prayed for a writ *de ventre inspiciendo*, to have the widow examined, and the sheriff of London was accordingly directed to have her examined. He returned that she was twenty weeks gone with child, and that within twenty weeks *fuit paritura*. "Whereupon another writ issued out of the Common Pleas, commanding the sheriff safely to keep her in such an house, and that the door should be well guarded; and that every day he should cause her to be viewed by some of the women named in the writ, (wherein ten were named,) and when she should be delivered, that some of them should be with her to view her birth, whether it be male or female, to the intent there should not be any falsity. And upon this writ the sheriff returned, that accordingly he had caused her to be so kept, and that on such a day she was delivered of a daughter."*

There is another case where the court has interfered on proof of the existence of pregnancy being brought before it, and that is, where a female in this situation is imprisoned. Thus in the case of Elizabeth Slymbridge, (Croke's James, p. 358,) "upon suggestion that she had been imprisoned for divers weeks and was with child, and would be in danger of death if she should not be enlarged," Sir Edward Coke, the Chief Justice, admitted her to bail to prevent the peril of death to her and her infant, and in giving his opinion he quotes a similar case which happened in the 40th of Edward III. The editor remarks that these cases are cited as extraordinary instances. The last case is mentioned in Coke upon Littleton, 289 *a*.—The record states: "Quia eadem Elena pregnans fuit, et in periculo mortis, ipsa dimittitur per manucaptionem ad habendum corpus," &c.

When proceeding to an investigation of this kind, we must recollect that the signs or proofs of pregnancy are to be collected from various and very different sources, and, moreover, that of some of them we can have no evidence except from the report made to us, while of others we can judge by the changes existing before us, and cognizable by our senses. The following are the chief of these signs:—

1. Certain affections of the constitution induced by pregnancy, which are the result of the new action which has commenced in the uterus; such as suppression of the menses, generally increased irritability of the nervous system, evinced in capriciousness of temper, or perhaps in the production of erratic pains, as in the face and teeth, greater activity in the circulating system, and especially in the exhalents, giving rise to œdema and other forms of dropsical effusions; alterations in the countenance from absorption of the fat, &c.

2. In consequence of the irritation induced in the uterus, there are a train of sympathies excited in other organs, affecting either their physical constitution or their peculiar functions: such, for instance, are the changes produced in the breasts by which their size is increased, with tingling pains, the areola formed, and milk secreted; the stomach is irritable; vomiting ensues; the appetite becomes variable and capricious, and sometimes the salivary apparatus participates so decidedly in the irritation that complete salivation takes place.

3. The altered condition of the uterus itself, which, increasing in size, ceases to be a pelvic organ, and rises into the abdomen, which in consequence becomes enlarged and prominent, and a corresponding change is effected in the state of the umbilicus; while at the same time certain alterations take place in the os and cervix uteri, affecting their form, texture, &c. which we can recognize by touch.

4. The contents of the uterus so enlarged; the presence of a fœtus therein, and its motions, which we endeavour to ascertain by manual examination, both *externally* through the abdominal parietes, and *internally* per vaginam; and also by the adoption of auscultation to discover the pulsations of the fœtal heart and the placentary sound.

5. Certain organized substances may, under suspicious circumstances, be discharged from the uterus, by a proper examination of which we may be enabled to determine whether they are the product of conception, and of course proofs of pregnancy.

6. After death we may be called on to make an investigation for a like purpose, and, by examination of the uterus and its appendages, to determine the question of actual pregnancy, or of previous impregnation. We shall notice the principal of these signs in detail.

Suppression of the Menses.—This is one of the symptoms of pregnancy our investigation of which must almost always be encumbered with this difficulty,—that our knowledge must be derived from the statement of the female herself, nor can we have in general any certain means of disproving or confirming her assertion. It is moreover a circumstance which, notwithstanding its general subjection to a fixed law, has been fully proved by experience to be liable to very many exceptions and deviations.

We are indeed quite justified in adopting as a general rule that in healthy women, whose menstruation has been established and continued regular, and who are not nursing, conception is followed by a suppression of the menstrual discharge at the next return of its period; but then this suppression may not so occur, and on the other hand it may happen from a variety of other causes altogether unconnected with pregnancy: for these reasons we ought, whenever we come to consider this sign, to weigh very fully all the possible circumstances of the individual case before us, and view it in relation to the various exceptions which

* Croke's Elizabeth, p. 566. See also in the matter of Martha Browne *exparte* Wallop in Brown's Chancery Cases, vol. iv. p. 90: and *exparte* Aiscough. Peere Williams' Reports, vol. ii. p. 591.

experience has from time to time shown to exist. Thus we must recollect that cases have occurred in which conception took place previous to menstruation. One instance of this happened under our own observation, and a very remarkable one is mentioned by Morgagni in these words: "I was acquainted with a maiden of a noble family who married before menstruation took place, though the menses had been expected for some years; nevertheless she became exceedingly fruitful. We were the less surprised at this circumstance because the same thing had happened to her mother."* Frank had a patient who gave birth to three children without ever having menstruated or had lochial discharge, and he saw three others who never had the catamenia, but were not deficient in lochia after delivery. (De Morb. Hom. Curand. art. *Amenorrhœa.*) A woman, 55 years of age, very lately resided in Cornwall, who had borne several children and always enjoyed good health, but had never menstruated or had vicarious discharge of any kind.† Capuron quotes several cases of fecundity without menstruation, (Méd. Lég. relat. à l'accouchement, &c. p. 96–7,) and Foderé assures us of the fact. ("J'ai eu occasion de m'assurer completement de ce fait." tom. i. p. 395.)

Some women are very irregular in the returns of their menstrual periods, having them prolonged much beyond the usual interval. The writer lately attended an unmarried woman of 40 affected with polypus uteri, who assured him that the returns of the catamenial discharge with her had been frequently deferred for more than six months without any accompanying circumstances of ill health: instances of habitual suppression for shorter periods are frequently met with. Zacchias mentions that he attended a patient who used to menstruate regularly, but who never conceived until the discharge had been suppressed for three or four months previously. A case somewhat similar is related by Mauriceau, (Observation 556, tom. ii. p. 461,) who very justly remarks that such cases not unfrequently give rise to the supposition of protracted gestation.

At the period which is usually denominated *the change of life*, it is very usual to have the menses suppressed for two or three months and then return profusely, giving rise to the idea of pregnancy and abortion, both suppositions being equally unfounded.

On the other hand cases occasionally occur in which women have conceived after menstruation had apparently ceased.

In married women, and others who have been incurring the risk of pregnancy, suppression may arise from a variety of causes altogether independent of conception, such as different forms of disease, exposure to cold and hardship, mental emotions, particularly that of fear, the effects of which latter we have had an opportunity of observing in very numerous instances, in some of our prisons, where young women constantly apply to the physician in consequence of their menses being suppressed, which they very often, and apparently with great reason, ascribe to the alarm and terror which they suffered when arrested and carried to prison.

A woman may conceive while she is nursing, without any previous return of the catamenia, which, however, very usually happens in such cases, as observed by Denman.

Here, then, we have a variety of cases in which the absence of the menstrual discharge could not be made a means of diagnosis, or, if assumed as affirmative of pregnancy, would lead us into absolute error.

It now remains to view the matter in another light, and inquire, how far the presence of the catamenia can be considered as evidence that the woman is not with child.

We have met with several instances of menstruation occurring *once* after conception, and at this moment we are in attendance on two ladies to both of whom it happened; and one of them who has borne three children and is now a fourth time pregnant, assured us that she always knew when she had become with child by the unusual profuseness of the next period. This is distinctly taken notice of by Johnson, who says, "some have the menstrua copiously at the first period." (System of Midwifery, p. 100.) A diminution in the quantity under similar circumstances has, however, been more frequently observed. "I have seen," says Desormeaux, "some cases in which the appearance of the menses in small quantity and at an unusual time, was almost a certain sign of conception." (Dict. de Méd. vol. x. p. 394.) A similar remark is made by Pazos, Stein, and Gardien. (Traité des Accouchemens, vol. i. p. 489.) An interesting case, which confirms this remark, is detailed by Dr. Dewees. (Compendium of Midwifery, p. 165.) A gentleman, who had been obliged to absent himself from his family for many months, returned secretly and spent one night at home with his wife, in consequence of which she conceived, as the event proved, although the regular return of her catamenia a week afterwards in their usual quantity, had led her to expect that she had escaped with impunity.

Again, there are individuals who menstruate with regularity *for more than one period* after conception. "It is well known," says Burton, (New System of Midwifery, p. 285,) "by experience, that the menstrual discharge sometimes continues in its usual regularity for two or three months after conception without any dangerous consequences." Instances of this are not at all unfrequent, and are quoted by all who have written at large upon this subject.‡ It has been asserted as an objection, that these discharges are not truly menstruation; but the discussion

* De Causis et Sedibus Morborum, Epis. xlvii. 3. See also Foderé, Méd. Lég. tom. i. p. 395, and tom. ii. p. 437. Desormeaux, Dict. de Méd. tom. x, p. 393. And Mauriceau, Obs. 393, vol. ii. p. 326.

† "Ego habui amicam laudabilis temperamenti et complexionis quæ octo filios tulit consequenter, id est omni anno unum; nunquam tamen visa una gutta sanguinis menstrui." Low, p. 523.

‡ *Capuron*, Méd. Légale, p. 63. *Belloc*, Quest. Méd. Lég. p. 62. *Mauriceau*, vol. i. p. 72, 155. *Dewees*, Compendium, p. 93, et seq. *Desormeaux*, Dict. de Méd. vol, x. p. 394. *Gardien*, vol. i. p. 489. *Gooch*, Diseases of Females, pp. 202-3. *Van Swieten*, Commentaries, vol. xiii. pp. 379, 468. *Bech*, Principles of Med. Jurisp. p. 76. Van Swieten supposes such discharges do not proceed from the same source as the regular menses, "but from the vessels distributed about the vagina and the external surface of the neck of the womb." A similar opinion is maintained by Hoffman, Med. Ration. et. Syst. tom. iv. part 2 cap. 623, and by Frank.

of that question does not concern us here. We have only to consider whether there does not frequently, during pregnancy, take place a coloured discharge from the vagina, so closely resembling menstruation in its periods, quantity, and duration, that neither the woman herself nor the medical inquirer shall be able to detect any difference between them; and of this we must declare with Dewees and Gooch, "there can be no doubt."

In still more rare instances, of which we have ourselves never met one, but which are recorded by writers of credit, women have continued to have these discharges through nearly the whole period of pregnancy. (*Foderé*, vol. i. p. 437.) Dewees mentions an instance in which this happened to both mother and daughter, (*Dewees*, Comp. Mid. p. 96,) who were in the habit of menstruating up to the seventh month. "On a vu," says Gardien, "chez des femmes jeunes et pléthoriques l'évacuation menstruelle continuer pendant les trois ou quatre premiers mois, quelquefois même pendant tout le cours de la grossesse." (Traité des Accouchemens, tom. i. p. 489).

The last, and perhaps most remarkable exceptions to the general rule, to which it appears necessary to allude, are those very singular cases in which menstruation has either appeared for the first time after conception, or in which it continued only during pregnancy. Perfect's eightieth case (Cases in Midwifery, vol. ii. p. 71) affords a very satisfactory instance of the former; and Daventer, Dewees, and Baudeloque,* furnish us with examples of women whose habit it was to menstruate *only* during pregnancy, and who did so through the whole period of that condition, though never at any other time.

There is a source of deception against which we can hardly guard, and which we know to have been resorted to by a young woman in one instance. She apprehended that she was pregnant, but deceived those about her by staining her linen at the usual periods of menstruation: this completely lulled the suspicion of her friends for two months, but in the third a circumstance was discovered which proved that she had incurred the risk of pregnancy, and the writer was requested to see her. On looking at her breasts, the areolæ were so distinct, and exhibited their proper characters so perfectly, that he felt persuaded she was pregnant; and perceiving that her breasts were marked with the silvery lines observable on parts formerly much distended, he told her his opinion that she was then with child, and moreover that she certainly had been so before. This completely took her by surprise, and she acknowledged that she had given birth to a child about two years before, and had suffered much from the distension of her breasts during pregnancy. The event also proved that we were correct in supposing her pregnant then, as she was afterwards in proper time delivered of a full-grown child.

Belloc, p. 65, takes notice of this kind of imposition, which he informs us was attempted on himself by a girl three months advanced. "Il faut alors exiger que les parties soient lavées avec de l'eau tiède; si le sang ne reparait pas, le cas est suspect." (*Capuron*, p. 81. See also *Beck*, p. 76, and *Mahon*, Méd. Légale, vol. i. p. 153. *Foderé*, tom. i. p. 438.)

We should not forget that there are cases occasionally met with, in which suspicions arise in connection with a non-appearance of the menses, the elimination of the discharge being prevented by some adventitious structure or imperforate state of some of the natural parts, especially of the hymen. In such a case the secretion takes place, but being prevented from leaving the body, accumulates within, distending the vagina and the uterus, and so giving rise to several of the sympathies usually accompanying pregnancy. We had very lately an instance of this under our care in a girl of 17, who between the age of 15 and 16 began to exhibit the signs of puberty. When we saw her, suspicions had been excited of her being pregnant. The abdomen was enlarged, and the uterus could be felt as high as the umbilicus, the breasts were painful, and she had occasional vomiting, and pain in the back and along the thighs. Complete inability to pass water was the cause of our being requested to see her, and on hearing the above detail of symptoms, we confess we had our suspicions too, but did not express them: on attempting to pass the catheter we encountered a soft elastic tumour protruding from the external parts, displacing the urethra, and concealing its orifice. This rendered a closer examination necessary, which detected the hymen attached completely all around, and distended by fluid from within: having relieved the bladder, we punctured the opposing membrane and gave exit to about three pints of a dark chocolate-coloured fluid, without smell and uncoagulated.

Frank (Epitome de Morbis Hominum Curandis. Art. *Amenorrhœa*,) mentions two such cases, in one of which the abdomen was as much enlarged as at the sixth month of pregnancy, and the girl herself thought that she felt a foreign body in the uterus, which, however, was found to contain five pounds of a dark and thick blood, without any offensive odour: in the other case the girl was believed to be with child, and in consequence suffered temporary loss of reputation, but the hymen was found imperforate, and, when punctured, gave passage to several pints of blood.

Madame Boivin (Mémoire sur les Hémorrhagies internes de l'Utérus, p. 73,) has collected the details of ten such cases, among which are two much in point. In one from Denman the girl was submitted to examination from a belief that she was with child: the uterus was as high as the navel, and contained no less than four pounds of blood of the colour and consistence of tar. (Introduction to Midwifery, p. 87. 5th ed.) The other case occurred to Dr. Macauly, in a young woman of 19, whom he supposed to be not only pregnant, but in labour, as she had pains, and he felt what he thought was "the membranes with the water pushing low down." (Smellie's Cases in Midwifery, vol. ii. p. 15.) On puncturing the hymen there came away two quarts of thick black blood. In a case of obstruction related by Dr. Dewees, he mentions that he was fully impressed with the belief that pregnancy existed, as he could distinctly feel the enlarged uterus, and even thought

* *Daventer*, Novum Lumen Art. Obst. cap. xv. p. 54. *Dewees*, Comp. Mid. p. 97. *Baudelocque*, Art. d'Accouchement, vol. i. p. 197-8. Ed. 1822.

he felt the motion of a fœtus. (Essays on several subjects, &c. p. 337.)

Such exceptions should always be taken into account, to guard us against error, but on the other hand absence of the menstrual discharge in an otherwise healthy woman is always a circumstance of great importance, concerning which the remark of Belloc is deserving of great attention. "When a female," says he, "experiences suppression along with other symptoms of pregnancy, we may consider her situation as yet uncertain, because these signs are common to amenorrhœa and pregnancy. But if towards the third month, while the suppression continues, she recovers her health, and if her appetite and colour return, we need no better proof of pregnancy. Under other circumstances her health would remain impaired, and even become worse." (Cours de Méd. Légale, p. 60.)

Nausea and vomiting. — In general, when pregnancy has occurred, the stomach becomes irritable, in consequence of which the woman is distressed with nausea and vomiting, especially in the early part of the day: in some this commences almost immediately after conception. We had once a lady under our care, in whom there was reason to believe it began the day after marriage, and the date of her labour corresponded to such a belief: most frequently it occurs for the first time between two and three weeks after conception, in others not for as many months, and in some not at all: of this we have now seen several instances.

On the other hand, irritability of the stomach may occur from a variety of causes totally independent of pregnancy, and connected with disease or disordered function, such as suppressed menstruation, so that we must be slow to draw an inference merely from the presence of such a symptom: at the same time a proper degree of inquiry will generally enable us to distinguish between the two kinds. The vomiting of pregnancy is not accompanied by any other symptom of ill health; on the contrary, the patient feels perhaps as well as ever in other respects, and may even take her meals with as much appetite and relish as at other times, but while doing so, or immediately after, she feels suddenly sick, and has hardly time to retire when she rejects the whole contents of the stomach, and presently feels quite well again: in some instances, however, the woman is distressed by a perpetual nausea, and in a few rare cases vomiting has been so excessive as to endanger the life of the woman from inanition. (See Mem. Lond. Med. Soc. vol. ii. p. 125. Med. Chir. Trans. vol. iii. p. 139. Ashwell on Parturition, p. 194.)

Salivation.—By an extension of the sympathetic irritation which in the stomach causes nausea and vomiting, the salivary apparatus is in some persons excited to such a degree as to produce complete and copious salivation. This fact was expressly noticed by Hippocrates as one among the symptoms of pregnancy, (the passage is quoted by Van Swieten, vol. xiii. p. 371,) and has been observed by many others since. (See Gardien, vol. ii. p. 32. Burns, p. 237.) Dr. Dewees records a well-marked instance of the kind, (Compendium of Midwifery, p. 115,) and the writer of this article was consulted about another in which it occurred profusely in two successive pregnancies, but ceased immediately on delivery.

Affections of the Mammæ.—When conception has taken place, and the menses have been suppressed for one or two periods, the woman generally becomes sensible of an alteration in the state of the breasts, in which she feels an uneasy sensation of throbbing, or of stretching fulness accompanied by tingling pains felt about the centre of them and in the nipple. The breasts themselves grow sensibly larger and more firm; a circle around the nipple becomes altered in colour and in structure, constituting the areola; and as gestation advances, milk is secreted. But there is considerable variety in the period of gestation at which these changes may occur, as well as in the degree of their development; for while in some instances they may be recognised very soon after conception, in others they are hardly perceptible until gestation is far advanced, or even drawing towards its termination. In general, however, we may expect to find these sympathies (except the secretion of milk) established when two months of pregnancy have been completed; but any opinion deduced from their existence must be modified by several considerations. We must recollect that these changes of form and size may be the result of causes unconnected with conception. In many women the breasts enlarge merely in consequence of marriage and the habits thence arising; in others it may happen from the person becoming fat; it may be caused by accidental suppression of the menses, or their retention by an imperforate hymen, (see cases noticed under the preceding section,) or by any cause capable of distending the uterus. The enlargement from pregnancy may, however, in general be distinguished from that produced merely by fat, by the greater firmness of the breast, which also feels knotty and uneven when pressed by the hand. With some women of an irritable habit, swelling and pain of the breasts accompany each return of the catamenia, especially if they are the subjects of dysmenorrhœa; but under such circumstances the tension and uneasiness subside in two or three days, whereas that caused by pregnancy continues to increase, except when the ovum happens to be blighted, in which case the breasts become flaccid, and lose the characters which they had previously assumed. On the other hand it not unfrequently happens that in women of weakly and delicate constitution very little change can be observed in the breasts till pregnancy is far advanced. Gardien (Traité des Accouchemens, tom. i. p. 490) asserts that the swelling of the breasts is not observable in women who menstruate during the early months of pregnancy; and Mahon (Médecine Légale, tom. i. p. 151) makes the same observation. It should also be recollected that such a condition of fulness of the breasts may be natural to the individual, or it may take place at the turn of life, when the menses becoming naturally suppressed, the person grows at the same time fatter, and the breasts under such circumstances become full, and are not unfrequently painful,—which circumstances concurring are often improperly considered in the light of cause and effect, and irritability of the stomach being at the same time experienced, the woman believes herself preg-

nant. There is, however, one of those changes which, if carefully observed, is of the utmost value as an evidence of pregnancy, which, according to our experience, can alone produce it,—we allude to the altered condition of the areola.

The Areola. — The alteration which takes place in that part of the breast which immediately surrounds the nipple, and is called the areola, appears to us not to have received that degree of notice which its importance merits, as being one of the most certain external indications of pregnancy, arising from the operation of sympathy. On this, however, as on almost all other points connected with this investigation, a very marked difference of opinion exists; for while some suppose, with Denman, that the alteration in the areola "may be produced by any cause capable of giving to the breasts a state resembling that which they are in at the time of pregnancy," many others of equal authority maintain the opinion of Smellie and William Hunter, who regarded it as the result of pregnancy only: an opinion in which we entirely concur, and think we shall be able to show that much of the discrepancy of opinion on this subject has arisen from want of sufficient care in observing and accuracy in describing the essential characters of the true areola.

Most of those who have noticed this change appear, from their observations on it, to have attended to one only of its characters,—namely, its colour, which is, in our opinion, the one of all others most liable to uncertainty. We should here, perhaps, except the description by Rœderer, which is by far the most accurate we have met with:—"Menstruorum suppressionem mammarum tumor insequitur; quocirca mammæ crescunt, replentur, dolent interdum, indurescunt: venæ earum cœruleo colore conspicuæ redduntur, *crassescit papilla, inflata videtur, color ejusdem fit obscurior, simili colore distinguitur discus ambiens qui in latitudinem majorem expanditur, parvisque eminentiis, quasi totidem papillulis, tegitur.*" (Elem. Artis Obstet. pp. 46, 47.)

The several circumstances here enumerated at least ought in all cases to form distinct subjects of consideration, when we propose to avail ourselves of the condition of this part as an indication of the existence or absence of pregnancy. One other we shall add as equally constant, which is a soft and moist state of the integument, which, together with its altered colour, gives us the idea of a part in which there is going forward a greater degree of vital action than is in operation around it; and we not unfrequently find that the little glandular follicles are bedewed with a secretion sufficient to damp and colour the woman's inner dress. We must recollect also that these changes do not take place immediately after conception, but occur in different persons after uncertain intervals: we must therefore consider, in the first place, the period of pregnancy at which we may expect to gain any useful information from the condition of the areola.

We cannot speak very positively as to what may be the earliest period at which this change can be observed, but we have certainly been satisfied of its existence at the end of the second month, at which period the change of colour is by no means the most distinct character to be observed, but the turgescence of the nipple and the development of the little glandular follicles are the objects which should principally engage our attention; the colour at this period being in general little more than a deeper shade of rose or flesh colour slightly tinged with a yellowish or brownish hue. During the progress of the next two months the changes in the areola are in general perfected or nearly so, and it then presents the following characters: a circle around the nipple, whose colour varies in intensity according to the peculiar complexion of the individual, being generally much darker in persons with black hair, dark eyes, and sallow skins, than in those of fair hair, light-coloured eyes, and delicate complexions. The extent of this circle varies from a diameter of an inch to an inch and a half, and increases in some as pregnancy advances, as does also the depth of colour.*

In the centre of this circle the nipple is observed partaking of the altered colour of the part, and appearing turgid (Crassescit papilla, inflata videtur, *Rœderer,*) and prominent; and the part of the areola more immediately around the base of the nipple has its surface rendered unequal by the prominence of the glandular follicles, which, varying in number from twelve to twenty, project from the sixteenth to the eighth of an inch;† and, lastly, the integument covering the part is observed to be softer and more moist than that which surrounds it, and the breasts themselves are at the same time observed to be full and firm, at least more so than was natural to the person previously. Such we believe to be the essential characters of the true areola, the result of pregnancy, and that, when found possessing these distinctive marks, it ought to be looked on as the result of that condition alone, no other cause being capable of producing it.

But we cannot stop here and rest satisfied with the knowledge of the distinctly affirmative part of the question only, without also looking to certain circumstances which will most materially modify the certainty of our conclusions.

In the first place, then, pregnancy may exist, and the areola remain deficient in at least one of its usually essential characters, and that, the one too generally supposed to be its most important distinctive mark,—namely, the colour. Within the last few months the writer saw two well-marked instances of this; one in a lady of very fair skin, blue eyes, and light hair; the other in a lady of fair skin, but with black hair and very dark-brown eyes: in both, the colour of the areola was so slight as hardly to differ from that of the surrounding skin, and certainly was less distinct than we have frequently seen it in the virgin, but all the other changes which we have enumerated were well developed in both.

Again, we must recollect that a woman may be presented to us for an opinion, who having perhaps very recently miscarried, her breasts may exhibit all the true characters of the areola, com-

* We lately saw the areolæ on the breasts of a young woman, of very dark complexion, at the time of labour; they were of a very deep shade, and exceeded three inches in diameter. In negro women the areolæ is almost jet black.

† For a very full account of the structure of this part of the breast, see Meckel's Anatomy, vol. iii. p. 652.

bined with several other circumstances really indicating a state of pregnancy; but if we do not use great caution in giving our opinion, it will in such a case appear falsified by the event, although really correct. In nurses, also, the characters of the areola are kept up and continue in a state of considerable perfection.

Now, as to the colour alone, we may adopt this belief—that where we find it of a deep and dark brownish shade, forming a circle round the nipple, even though unaccompanied with the other changes natural to the part, it affords very strong presumptive evidence of a former state of pregnancy; but when so accompanied, it is a mark of great value, and in our experience has never yet deceived us: and we certainly never saw any other condition of the part produced by disease which could possibly be mistaken for it. At the same time it should be observed that the areola does not always, in pregnant women, present all the characters we have described as belonging to it. We have seen it at the time of labour presenting the dark circle alone without the prominence of the glandular follicles, but we never saw an instance of their development, as already described, without the concurrence of pregnancy: their absence, therefore, ought not to decide our opinion against the existence of that condition, though their presence would be with us a very convincing proof of previous conception: we should also be cautious in being influenced by the condition of this part, before the period at which its characters are in general developed and perfected, as already described.

A case which occurred recently, while the writer was lecturing on this subject, afforded a very satisfactory illustration of the value to be attached to this evidence of pregnancy. A young woman came a considerable distance from the country to be admitted into Sir P. Dunn's Hospital, the medical men in the country not having succeeded in affording her relief or restoring her health. A very prominent symptom of complaint was amenorrhœa of four months' duration, accompanied by uterine pain, want of appetite, &c. A very intelligent pupil suggested to the writer, after lecture, that he thought we must be mistaken in our account of the subject, as there was then in the house an unmarried patient, labouring only under amenorrhœa, whose breasts presented the areola, with all the characters we had described. We immediately saw her, and on examining her breasts we pronounced at once that there was the true areola of pregnancy—an announcement which she heard with the most fiery indignation, declaring that she would submit to any thing rather than lie under so calumnious an aspersion, and even consenting to permit an examination per vaginam, when proposed to her as the only thing which could save her character. On making the examination we were distinctly able to feel the fœtus by *ballottement*. She afterwards acknowledged that she had been "walking by moonlight with a young man who had a great regard for her."

If a woman has been pregnant before, and particularly if she suckled or is nursing, it may greatly embarrass our investigation. The colour of the areola depends on the deposition of an actual pigment between the cuticle and subjacent skin. Of this we have satisfied ourselves by making preparations of the part, one of which, showing this very distinctly, is preserved in the writer's museum. In some persons of fair complexion especially, this colouring matter is removed in some time after delivery, and the breast resumes its virgin appearance; in others the colour remains permanent, and there is even a slight prominence of the little glands to be observed sufficient to deceive an inexperienced eye. It is also to be recollected that it is peculiar to some young females to have the areola assume a shade of colour resembling that which we so frequently observe around or under the eyes.

The conclusion which Gooch came to on this subject was, that "darkness of the areola rarely depends on other causes (than pregnancy), and that, when it exists, it may generally be looked upon as a sign either that the patient is pregnant or has been so formerly." (Account of Female Diseases, p. 205.) It seems remarkable that so accurate a writer as Gooch should have confined his description to the colour alone. Smellie's account is more accurate, and he considers it as the result of pregnancy only. (Treatise on Midwifery, vol. i. p. 191.) William Hunter has not, as far as we are aware, left us any description of what he considered the true areola, but he professed such faith in this sign as to assert that he could always judge by it whether a woman was pregnant or not, and on one occasion gave a remarkable proof of his accuracy. Happening to examine the breast of a subject brought to him for dissection, he immediately pronounced from the appearance of the areola, that the woman had died pregnant: however, on examining the genitals, the hymen was found entire, but Hunter persisted in his opinion, declaring that the areola was more convincing than the presence of the hymen. The body was opened, and an impregnated uterus confirmed the justice of his assertion.

Since writing the above, a case has come under the writer's observation which greatly strengthens his reliance on this sign. We were requested to see a patient affected with menorrhagia, arising, as was supposed by her medical attendant, from disease of the uterus. The history of the case was briefly this:—the patient was near forty years of age, and had borne five children; in the May preceding she had miscarried in the fifth month, and the placenta was retained eight weeks. In July she returned to her husband's bed, but her health continued feeble, and she had at irregular intervals of one, two, or three weeks, profuse and foul uterine discharges, but had none of the usual symptoms which used to accompany her pregnancy in former instances, so that she utterly disbelieved in the possibility of her being then with child. For two months previous to our seeing her, her fears had been much augmented by the presence of a tumour in the centre and lower part of the abdomen, which was almost constantly the seat of severe pain; and she had still the foul uterine discharges. Under such circumstances we entertained but little idea of the existence of pregnancy, but on seeing her breasts we were rejoiced to find them full, and exhibiting a very perfect example of the true areola, with all its characters so well marked that we did not hesitate

to declare our belief that she was pregnant, though every other circumstance conspired to render it more than improbable. The uterine tumour felt as hard as cartilage, and knotty all over its surface, was very painful, and exquisitely tender to the touch; but the condition of pregnancy was put beyond a doubt in less than a week afterwards by her expelling a fœtus of five months, and along with it its placenta quite perfect, and afterwards several pieces or fragments of a substance resembling decidua, mixed up with what appeared to be portions of placenta and membrane, but altered in their texture and consistence so as to possess the toughness of leather.

Could these have remained in utero from the time of the former miscarriage? They certainly were totally different from any of the parts of undoubtedly recent formation. The expulsion of them went on for fully half-an-hour after the rest of the process was completed, and portions continued to be discharged for some days; after which the patient recovered well, and at the end of a month there was not a trace of uterine irritation or discharge, and she considered herself in better health than she had been for a year before.

[But although the state of the areola constitutes one of the best single proofs of the existence of pregnancy, it is obvious, that for accurate discrimination, it is necessary to be aware of the hue, in each particular case, in the unfecundated state. Moreover, instances are on record of a well-marked areola in persons who were not pregnant, as well as of an entire absence of areola in those who were. Dr. Guy (*Principles of Forensic Medicine*, p. 72, Lond. 1843) states, that Dr. John Reid showed him a case of enlarged mammæ, with distinct areolæ and mucous follicles, in a female, who had never been, and was not at the time, pregnant. (See Dr. Reid, in *Lond. Lancet*, Dec. 22, 1838.) The writer has had numerous opportunities for appreciating the insufficiency of these evidences when taken singly.]

Milk in the Breasts.—The secretion of milk in the breasts is popularly esteemed as an infallible proof of pregnancy, but nothing can be more erroneous than such a presumption, which is contradicted by facts, recorded on the best authority, proving the possibility of its formation under circumstances totally independent not only of pregnancy but even of intercourse, and at ages antecedent to puberty, and after the cessation of the generative faculty.

Perhaps the most remarkable case on record is that of the little girl of Alençon, who was produced by Baudelocque (Art d'Accouchement, tom. i. p. 188. ed. 1822) before the Royal Academy of Surgery on the 16th Oct. 1783, where she milked her breasts in presence of the members. This girl was only eight years old, and the secretion was caused by the repeated application of an infant which her mother was suckling at the time.

Belloc (Cours de Méd. Légale, p. 52) mentions a servant girl, who, being obliged to have sleeping in her chamber an infant which was being weaned, and which by its crying disturbed her rest, bethought her of giving it her breast to appease its clamour; and the result was that in a short time she had milk enough to satisfy the child. Foderé mentions having seen a lady, who, in order to escape being imprisoned, pretended that she was a nurse when she was not, and she succeeded in producing milk from her breasts. (Traité de Méd. Lég. vol. i. p. 440.)

The same phenomenon has occasionally occurred in women advanced in years. The following case is related by Mr. George Semple. (North of England Med. and Surg. Journ. vol. i. p. 230.) "Mrs. B. wife of John Breward, Simpson Green, near Idle, aged forty-nine, the mother of nine children, the youngest of whom is twelve years old, lost a daughter-in-law about a year ago, who died in about a fortnight after giving birth to her first child. On her death, Mrs. B. took charge of the infant, a little puny, sickly baby. The child was so fretful and uneasy, that Mrs. B. after several sleepless nights was induced to permit the child to take her nipple into its mouth. In the course of from thirty to thirty-six hours she felt very unwell, her breasts became extremely painful, considerably increased in size, and soon after, to her utter astonishment, milk was secreted and poured forth in the same abundance as on former occasions after the birth of her own children. The child, now a year old, is a fine, thriving, healthy girl, and only a few days ago I saw her eagerly engaged in obtaining an apparently abundant supply of healthy nourishment from the same fountain which nearly twenty years ago poured forth its resources for the support of her father." Several other instances still more remarkable are on record. (See Smith, Forensic Medicine, p. 484; Beck, p. 75, note; Philos. Trans. vol. ix. and vol. xxxi. Capuron, p. 126.)

[The writer, in another work, (*Human Physiology*, 5th edit. ii. 437, Philad. 1844,) has referred to many such cases; and to several occurring in the male. One of the most striking was communicated to him by Professor Hall, of the University of Maryland. The subject of it—a coloured man, 55 years of age—was exhibited to the obstetrical class in the year 1827. He had large, soft, well-formed mammæ, rather more conical than those of the female, and projecting fully seven inches from the chest, with perfect and large nipples. The glandular structure seemed to the touch to be exactly like that of the female. This man, according to Professor Hall, had officiated as wet-nurse, for several years, in the family of his mistress; and he represented, that the secretion of milk was induced by applying the children, entrusted to his care, to the breasts during the night. When the milk was no longer required, great difficulty was experienced in arresting the secretion. His genital organs were fully developed.]

Another source of deception might arise from the fact that women sometimes after nursing retain milk in their breasts for a great length of time. The writer is at present in attendance on a lady, who, after weaning her last child, which she nursed for fifteen months, retained *for nearly three years* so much milk in her breasts that she was obliged to adopt precautions to prevent her dress being wet by it. The child is now five years old, and she can still express a little milk from the nipples; she has not conceived since the birth of that child, but has always menstruated regularly. Dr. Francis, in his edition of Den-

man, (Francis's Denman, p. 229,) mentions, on the authority of Professor Post, that "a lady of this city (New York) was almost fourteen years ago delivered of a healthy child; since that time her breasts have regularly secreted milk in great abundance, so that, to use her own language, she could at all times easily perform the office of a nurse. She has uniformly enjoyed good health, is now about thirty-five years of age, and has never proved pregnant a second time, nor had any return of her menses."*

"We see," says Foderé, "women who have milk in their breasts from one pregnancy to another, and even for whole years together, although they have not nursed." And he adds that he has had repeated opportunities of observing the secretion of milk take place on the cessation of the catamenia at the turn of life, of which fact he quotes two striking instances. (Médecine Légale, tom. i. p. 440-1 and note.)

It has been already remarked that morbid causes capable of distending the cavity of the uterus may excite the sympathetic changes in the breasts, and it appears that even the secretion of milk may be thus induced, as happened in two cases mentioned by Frank, where it occurred in one in consequence of physometra, (Vol. iv. p. 50. French translation,) and in the other from hydrometra. (P. 182, ibid.) Notwithstanding, however, the exceptions established by such facts as the foregoing, we should attach great consequence to the presence of milk in the breasts, and if found in connection with others of the rational symptoms of pregnancy, it ought to go a great way in confirming our belief in the existence of that condition, especially if occurring in a woman who had never borne a child or been pregnant before.

Quickening, and motions of the fœtus.—By quickening is generally understood the first sensation experienced by the mother, of the life of the child within her womb; and a notion is very generally entertained in society that it is on the occurrence of this phenomenon that the child becomes for the first time endowed with life.

It appears very unaccountable that such an absurdity should have received not merely the sanction of popular belief, but that it should form the grounds of law in most civilized countries, our own not excepted; for the English law adopts the distinction, and considers the fœtus before quickening as inanimate, or merely as *portio viscerum matris*, but as afterwards endowed with life; and on this principle acts in the award of punishment for crime. Thus in a law enacted in 1803, called the Ellenborough Act, it is ordained that if any person shall wilfully or maliciously use means to cause or procure abortion in a woman *not quick with child*, he shall be declared guilty of felony, and may be fined, imprisoned, set in the pillory, publicly whipped, or transported for any term not exceeding fourteen years; but if the offence be committed *after quickening*, it shall be punishable with death.† In like manner, when a woman pleads pregnancy in bar or stay of execution, the court orders an investigation as to whether she is *quick with child* or not, for being merely pregnant will not be sufficient;‡ and if she be pronounced *quick with child*, execution shall be stayed until either she is delivered, or proves by the law of nature not to have been with child at all. In France the law is at once more merciful and more consistent with the laws of nature and with common sense, when it provides that "if a woman condemned to die states that she is pregnant, and if it be proved that she is so, she shall not suffer punishment until after her delivery."§

It is perfectly monstrous and absurd to suppose for a moment that the fœtus does not enjoy vitality from the first moment of its existence, and of course long before the sensation of quickening is felt by the mother; and if it be asked why no indications of life are given before the time at which quickening generally takes place, the obvious answer is, that the absence of any consciousness on the part of the mother relative to the motions of the child is no proof whatever that such motions do not exist.‖ Of this fact the writer can speak with certainty. A married lady, who menstruated for the last time on the 10th of November, came to Dublin in March, on the 21st of which month a consultation was held to determine whether she was labouring under a disease of the womb or not, as she had been previously assured by her medical attendant that she could not be pregnant because she had not sick stomach, nor felt the child. On examination the writer distinctly felt through the abdominal parietes the limbs of the fœtus in motion, as did also Mr. Cusack and Dr. Marsh, and yet the lady herself had no consciousness whatever of any such sensation, nor did she *quicken* till the second week of the following month, April, and was delivered of a healthy boy on the 9th of August.¶

In attempting to make a knowledge of this phenomenon available in any inquiry as to the existence of pregnancy, even where there cannot be supposed any intention or motive on the part of the woman to deceive, we obviously labour un-

* The last mentioned particular in this case is in accordance with the aphorisms derived from Hippocrates: Si mulier, quæ nec pregnans nec puerpera est, lac habet ei menstrua defecerunt," which is, however, shown to be incorrect by the perfect regularity of the catamenia in the case under the writer's observation.

† This law has been, and I think justly, designated as immoral, unjust, and irrational; as tempting to the perpetration of the same crime at one time which at another it punishes with death; while in the words of the admirable Percival, "To extinguish the first spark of life is a crime of the same nature both against our Maker and society, as to destroy an infant, a child, or a man; these regular and successive stages of existence being the ordinances of God, subject alone to his divine will, and appointed by sovereign wisdom and goodness as the exclusive means of preserving the race and multiplying the enjoyments of mankind."—Percival's Works, vol. ii. p. 430, 1.

‡ "Here again the law of the land is at variance with what we conceive to be the law of nature; and it is at variance with itself, for it is a strange anomaly that by the law of real property, an infant *en ventre sa mère* may take an estate from the moment of its conception, and yet be hanged four months afterwards for the crime of its mother." Paris and Fonblanque, vol. iii. p. 141, note.

§ Code pénal, art. 27. See Foderé, tom. i. p. 428. See cases already detailed under the first section of this article.

‖ Vide Beck's Medical Jurisprudence, p. 137. Gardien, Traité des Accouchemens, tom. i. p. 508.

¶ It may be observed here that the facts of this case are completely in opposition to the explanation of quickening given by Dr. Royston and others, who suppose it to be coincident with, and resulting from, the sudden ascent of the uterus out of the pelvic cavity.

der this disadvantage, that except we are at the time able to feel the motions of the child, we can have no evidence except her statement as to the fact of quickening or otherwise; and nothing is more certain than that she may be completely mistaken on both sides of the question. We have just mentioned a case in which motion of the child perceptible to the hand of another was not felt by the mother; and a second instance of the same kind has occurred to us lately in the wife of a medical friend. On the other hand, the examples of women who have supposed and firmly believed that they had quickened when no such thing had occurred, are numerous even to notoriety. We remember being some years ago called in great haste to see a lady, the mother of seven children, who was said to be in premature labour at seven months and a half, accompanied with hemorrhage. On our arrival, her husband, who was a physician, mentioned among other things that she had quickened at four months and a half, and had from that time continued to feel the child as distinctly as in any of her former pregnancies, adding *that he had himself repeatedly recognised its movements also;* on examination, however, we could discover no child in utero, and the case terminated in the expulsion of a few coagula from the uterus without any fœtus whatever. We do not, however, mean to have it inferred that we should not pay any attention to the statements of married women on this subject: on the contrary, we should attach great value to the assertion of a person who has already, and perhaps repeatedly, experienced the sensation, and has at the same time no conceivable reasons for wishing to deceive; but for the reasons already stated, we cannot yield implicit credence to such representations, they may be mistaken, or they may have strong and powerful motives to misrepresent, known only to themselves. In cases of criminal, or even ordinary legal investigations, there is always a motive to influence the representations made by the woman, and we can only give credence in proportion as the account may appear to us to correspond to other circumstances or conditions of the case, of which we are satisfied. Should we be able to feel the movements of the fœtus, of course we could have no doubt on the subject; but it must not be forgotten that such an examination is liable to be unsatisfactory, or even lead us into error if great caution be not observed. It may be unsatisfactory, because it not unfrequently happens that even in women who have really quickened, and have been for several weeks conscious of the motions of the fœtus, we are unable either to feel the child or recognise its movements. The writer is at this moment in attendance on a lady who quickened more than six weeks ago, and is now in the sixth month of pregnancy, and after repeated examinations neither we nor her attendant physician have been able to feel the fœtus. In another case, in which ascites was combined with pregnancy, which had advanced to the seventh month, it was found impossible to feel the child by any mode of examination that could be adopted, though it was made with great care, both internally and externally, by the writer, and by one of the most experienced practitioners in Dublin. This case gave rise to great embarrassment, and recourse was repeatedly had to the application of the stethoscope in the most skilful hands; but neither the pulsation of the fœtal heart nor the placentary murmur could be heard, though it happened that several times during our examinations the woman assured us that she was at that moment sensible of active movements of the child. Desormeaux tells us of a patient of his who felt her child at the ordinary period, and its movements continued remarkably strong for three weeks, after which they ceased for a whole month, and nothing could excite them: the child was born alive and healthy. (Dict. de Médecine, tom. x. p. 399.) On the other hand we may fall into the error of supposing we have felt these movements, when in reality the woman is not pregnant at all. One such instance we have already detailed, and more recently we met with another. Dr. Dewees relates a very marked instance of such an error occurring to himself. A young lady had her menses suppressed for several months; her belly swelled very much, her breasts became enlarged, she had nausea and vomitings in the mornings; in short she had all the usual symptoms of pregnancy. "Examining the abdomen carefully," says Dr. Dewees, "I found it considerably distended; there was a circumscribed tumour within it, which I was very certain was an enlarged uterus. While conducting this examination, *I thought I distinctly perceived the motion of a fœtus.*"* Another source of error would of course be found in a power which it is asserted some women possess of simulating the motions of the child by certain actions of the abdominal muscles. We never met with any such case; but Dr. Blundell, who mentions the fact, tells us of "a woman who was seen by the late Dr. Lowder and other eminent accoucheurs, who simulated these movements so exactly, that, had they judged from this sign alone, they would have pronounced her pregnant." (Lectures on Midwifery, p. 251.)

We must now turn our attention to the period of pregnancy at which we may in general expect that this phenomenon shall have occurred. Experience has shown that it happens from the tenth to the twenty-fifth week; but according to the writer's experience, the greatest number of instances will be found to occur between the end of the twelfth and sixteenth weeks, or, adopting another mode of calculation, between the fourteenth and eighteenth week after the last menstruation. And under ordinary circumstances, when quickening does occur, but especially if it happens in conjunction with the sudden ascent of the uterus out of the pelvis, the woman is apt to feel an unusual degree of nervous agitation, which not unfrequently ends in faintness or even complete syncope, after which she is sensible of a slight fluttering sensation, which from day to day becomes more distinct, until she fully recognises the motions of the child. The earliest instance of which we were certain was in the case of a lady, who must have conceived on the 10th of November, and she quickened on the 28th of January, the interval being eleven weeks and two days; delivery oc-

* Essays on several subjects connected with Midwifery, pp. 337-8. The case eventually proved to be one of accumulation of menstrual fluid in the uterus.

curred on the 17th of August. A very general impression prevails in society, that quickening takes place exactly at the end of four calendar months and a half, whereas in fact the greater number of instances occur two or three weeks before that time has arrived, and many also not till long after. We have already mentioned one such case, and have by us notes of several others. At this moment we are in attendance on a lady who has in seven successive pregnancies felt the child for the first time in the sixth month, and once in the seventh. Baudelocque mentions that some of his patients did not quicken until after the sixth or seventh month, and, "in one of these women," he adds, "whatever we could do, and notwithstanding the very obvious ballottement of the child in utero, which we could perform by a finger introduced into the vagina, its motions could not be ascertained either by the mother or the accoucheur who examined her, till the end of the seventh month. (Art d'Accouchement, ed. 1822, pp. 205-6.)

"There are some cases," says Johnson, "where the motions are not felt till near the end of the reckoning." (New System of Midwifery, p. 102.)

A fact much more remarkable than the occasional postponement of this change is its total absence during the whole period of gestation, notwithstanding the subsequent birth of living and healthy children. Two instances of this kind came under our own observation, and the fact is mentioned by several writers of authority. Levret speaks of a woman who felt no motion of her child in two successive pregnancies. "I was several times consulted," says Baudelocque, "about a woman whose pregnancy appeared doubtful to her till the last moment, as well as to the physician, because the motions of the child could not in any way be perceived; and nothing that we could do even at eight months and a half could excite them: the child, however, was born healthy, and as strong as usual." Gardien met with two such instances; (Traité des Accouchemens, tom. i. p. 509;) and Gooch says on this subject, "there are cases, though rare, in which the child has not moved during the whole of pregnancy, although has been born alive and vigorous: of this I have known one instance, and read of others.*

When we wish to feel or excite the motions of the child in utero, we may expect to succeed by adopting either such a manual examination of the abdomen as we are accustomed to make when examining for a tumour in that cavity, pressing with the fingers backwards towards the spine, or from each side towards the centre; or applying one hand firmly against the side of the uterine tumour, we impress the opposite side quickly with the fingers of the other hand.

Sometimes the simple application of the spread hand over the front of the abdomen is sufficient for our purpose; at other times we shall best succeed by the sudden application of the hand previously rendered very cold by immersion in water, or contact with a marble chimney-piece: this frequently has the effect of making the fœtus as it were start, and communicate a very distinct sensation of its movements.

It is obvious that there are two species of movements of the fœtus which may thus be recognised, one of which depends on the exertion of its muscular power, and of course implies life; the other, the result of mere change of place or situation, effected by some external agency, and capable of being recognised equally in the dead and the living fœtus: this latter, which is more properly mobility than motion of the fœtus, may be most effectually ascertained by a manœuvre, which has been named by the French ballottement, and which we shall describe fully under the section which treats of the state of the uterus.

Size of the Abdomen and state of the Umbilicus.—An increase in the size of the abdomen being the necessary result of the development of the uterus from pregnancy, a careful examination of that part will be essentially required in every instance of an investigation as to the existence of that condition.

When conception occurs, and the ovum is received into the cavity of the uterus, the organ increases considerably in weight; and its fundus becoming at the same time developed, and so presenting a broader surface for pressure from the superincumbent viscera, it descends lower into the cavity of the pelvis, and so will not, for the first two months, or sometimes more, produce any enlargement of the abdomen by its increased bulk. Such an enlargement, however, is frequently observed at this early period, but it will be found on examination to arise from an inflated state of the bowels, which very generally takes place soon after the commencement of gestation, and continuing for some weeks will cause the patient to look as large or even larger in the second month, than she will afterwards appear in the third or fourth. This inflated state of the bowels generally subsides after a month or six weeks, and then the patient will not appear enlarged at all, but, on the contrary, the abdomen may be found flatter than is natural to the patient, and the umbilicus under such circumstances will sometimes be found more depressed,† and as if drawn inwards and downwards, in which condition it is occasionally the seat of an unpleasant and rather painful sensation of dragging, the part being also at the time somewhat tender on pressure.

This state, however, soon begins to alter, and before the end of the third month the enlargement of the abdomen becomes obvious to the eye, and from this period continues to increase gradually from month to month in the same proportion as the development of the uterus proceeds. In the fifth month the depressed condition of the umbilicus begins to diminish, and by the end of the sixth month it is generally raised to a level with the surrounding integument, and afterwards it in many persons projects above the surface.

Such is the history of this change in the perfectly natural and healthy condition of the pregnant woman; but as there is, on the one hand, a host of causes which may produce enlargement of the abdomen, and be accompanied also by sev-

* Account of Diseases of Women, p. 203. Dr. Dewees also relates a similar case, "where the motions of the child were never perceived during the whole period of utero-gestation." Compendium of Midwifery, p. 105.

† This change is noticed by Velpeau, vol. i. pp. 175-6, and also by others. The French have a proverb which says, "en ventre plat enfant il a y."

eral others of the symptoms of pregnancy when it does not exist; so also, on the other hand, a woman may be with child, and yet the development of the abdomen not correspond to the period which has elapsed since conception.

When the enlargement proceeds from a gravid uterus, and four months of pregnancy have elapsed, if the patient be placed lying on her back, with her shoulders a little raised, and the limbs at the same time drawn upwards, so that the thighs shall be in a state of semiflexion on the trunk, and the abdominal muscles thereby relaxed, if the woman be not very fat we shall be able to feel and trace the outline of the gravid uterus, at a height in the abdomen proportioned to the period of pregnancy, as stated in the preceding section; and even though we should not be able, from the fatness of the woman, the tension of the abdominal parietes, or any other cause, to feel distinctly the uterine tumour and define its circumstance, we shall at least ascertain that the cause of the enlargement is something which renders the abdomen much more solid to the touch than is natural to that part, and an examination per vaginam detects the coexistence of the changes in the uterus, already described as necessarily accompanying gestation; while at the same time the general health of the woman is found unimpaired or unaffected by any symptom of disease.

When the increased volume of the abdomen is the result of morbid conditions, not affecting the uterus, as disease of the liver, spleen, &c., an ovarian tumour, or ascites, we shall, in general, without much difficulty form our diagnosis from the history of the case, the length of time the enlargement has existed, which may have greatly exceeded the whole term of gestation, the general diseased condition of the system, the total want of correspondence in the symptoms and conditions of the case if it were pregnancy; and, lastly, a vaginal inquiry assures us that the uterus is not enlarged.

When the abdomen is distended by the accumulations of fat in the omentum or in the integuments, or by the inflated state of the bowels, the very soft and yielding condition of the part under the hand when pressed backwards towards the spine, and the total absence of any solid tumour, together with the non-existence of the ordinary symptoms of pregnancy, will form a sufficient basis for an opinion. Should there exist ascites, that condition can hardly be overlooked or mistaken; but it must not be forgotten that pregnancy and dropsy may exist together, and, when they do, they may present a combination of circumstances of the most embarrassing description.*

Again, we must remember that there are women, who, from their height or some peculiarity of form, exhibit their increase of size much less than others, so that the abdomen will appear less at seven months than it generally does in the fifth month.† And it is still more important to recollect, that although pregnancy should exist, if the child die the development of the uterus will be arrested, and the enlargement of the abdomen will not continue to increase, but, on the contrary, will sometimes diminish, the dead fœtus being retained in utero for several months, and the patient, although really many months pregnant, may not exhibit any increase of size beyond what is natural to her; or being near the end of her nine months, may not be larger than she was at four or five. The writer lately saw a case of this kind, which gave rise to great doubt. In the month of May he was requested to see a lady who considered herself in the eighth month of pregnancy, and was rendered miserably solicitous about her condition because she had irregular discharges from the uterus, and felt no motion of the child. On examination her abdomen was found perfectly flat and even depressed, and no tumour of any kind could be detected in its cavity; but the uterus felt per vaginam was evidently enlarged and soft, and the os and cervix uteri had undergone the changes which accompany early pregnancy. The lady had begun to experience the symptoms of that condition in October, which continued till the beginning of January, when they suddenly ceased, and she became liable to vaginal discharges. All doubt about the case was solved shortly after the writer's visit by the expulsion of an ovum with a blighted fœtus, which had evidently not arrived at three months' growth, and during its long stay in the uterine cavity as an extraneous body had become encrusted with a reddish calcareous deposit.

With regard to the changes which take place in the state of the umbilicus, it is to be observed that any solid tumour enlarging the abdomen will also be capable of effecting the elevation of the umbilicus, which circumstance, therefore, of itself can afford us no certain information that the distending agent is a gravid uterus; but if, in a case in which pregnancy is supposed to be advanced to the seventh or eighth month, we find the umbilicus depressed and the belly flat, it will prove certainly that gestation has not advanced to such a period, although it will not be, as asserted by Dr. Gooch, decisive evidence against the existence of pregnancy, which may be present, but not sufficiently advanced to effect the change, or the uterine development may have been arrested by the death of the fœtus.

[**State of the Vagina.**—It has been affirmed by Dr. Kluge, of Berlin, and by M. Jacquemin, of Paris, that a bluish tint of the vagina, extending from the os externum to the os uteri, is a sure test of pregnancy. According to the former, this discoloration commences in the fourth week of utero-gestation, increases until the time of delivery, and ceases with the lochia. M. Jacquemin, on examining the genitals of prostitutes, in compliance with the police regulations of Paris, observed the same peculiarity of colour in the same situation in those that were pregnant: he describes it as a violet colour, or like lees of wine, and so distinct as never to deceive him,—being sufficient of itself, and independently of the other signs of pregnancy, to determine the existence of that state. M. Parent Duchatelet (*De la Prostitution dans la ville de Paris*, i. 217, 218, Paris, 1837,)

* See case related in the section on *Quickening and motion of the fœtus* in the present article.

† The writer was once called on to attend a young unmarried female of respectability, whom he found in labour, and he was assured by her mother that up to the hour of her labour she never suspected that her daughter was pregnant, not having perceived any alteration in her size; and the young lady had danced all night at a ball about a week before her delivery: she had completed seven months.

affirms, that he was present when M. Jacquemin's accuracy in this matter was successfully put to the test: in the investigation, he examined no less than 4500 prostitutes. Dr. Montgomery, however, (*An Exposition of the Signs and Symptoms of Pregnancy*, p. vi. Lond. 1837,)—from limited observation, it is true—found, that whilst in some cases the bluish colour was very obvious, in others it was so slight as to be scarcely, if at all, perceptible. There is nothing more probable—as the writer has remarked elsewhere (*Human Physiology*, 5th edit. ii. 420, Philad. 1844,)—than that the capillary circulation of the mucous coat of the vagina may be modified along with that of the interior of the uterus during pregnancy, so as to give occasion to a change of colour like that mentioned by the above-cited observers; but it may be doubted whether the test can be often available, especially in private practice.]

State of the Uterus.—Having thus carefully investigated the circumstances of the case as far as we can discover them either by the report made to us, or infer them by the presence or otherwise by the sympathies already enumerated, we proceed in the next place to an examination of the uterus itself, having for our object to ascertain the following points:—the state of the os uteri and cervix; the condition of the organ with regard to development, and the degree to which it may be enlarged; the correspondence of such degree of enlargement with the other circumstances of the case; the cause of its increase, and the nature of its contents.

1. *State of the os and cervix uteri.*—In the unimpregnated condition of the uterus, its mouth and the lower section of the neck, when examined by the finger introduced into the vagina, can be felt projecting into that cavity from a quarter to half an inch. The part so projecting feels remarkably firm, and about as large as the end of a man's thumb, having in its termination in the vagina a transverse opening, whose lips or margins feel firm and well defined. This may be so far open as to allow the extremity of the finger to be insinuated between them to the depth of an eighth of an inch, sometimes a little more, sometimes not so much; or it may merely communicate a sensation of a slight depression almost without a cavity, such as is felt when the tip of the finger is pressed between the lateral cartilages at the extremity of the nose. Sometimes the os uteri differs very considerably from this description, being almost imperceptible from its diminutive size, and perfectly circular.

When conception has taken place, all these characters begin to alter; the change from the natural condition above described being distinct in proportion to the period of gestation at which the examination is made. In order to fit the uterus for the reception of the ovum and its support, there is, very soon after impregnation, a greater supply of fluids directed towards it; its vessels, which before crept almost imperceptibly through its dense structure, and with their calibre completely constringed, become distended and carry blood; the cellular texture is loosened out, and its interstices are infiltrated with a greater quantity of fluid, and in consequence the organ becomes not only altered in texture, but increased in size and weight. At this time, when the finger is applied to its vaginal extremity, the cervix is felt fuller, rounder, and softer or more springy and elastic under the point of the finger; and the same alterations having taken place in the labia of the os uteri, this part communicates a corresponding difference in the sensation received by the finger of the examiner: the margins of the orifice feel tumid, but softer and much less distinct, having lost the well-defined edge, which in the unimpregnated organ is natural to them; while the orifice itself, instead of seeming transverse, feels as if it were circular, and admits the tip of the finger more readily and to a greater depth than in its former state. As pregnancy advances, other changes in these parts may be appreciated. During the sixth month for instance, we ascertain that the cervix has not only undergone the changes of structure already detailed, but that it has lost somewhat of its length, owing to a portion of its upper section, or that which unites it to the body of the organ, becoming dilated, and taken up as it were to form a part of the distended cavity containing the child; and this obliteration of the cervix from above downwards continuing to be gradually effected, we find, if we examine towards the close of gestation, that the projecting cervix is no longer to be felt, but in its place there is detected, at the upper extremity of the vagina, a globular tumour, which is the enlarged uterus, with the head of the child to be distinctly recognised through its parietes. In like manner also the os uteri undergoes great changes of form, structure, and position, as pregnancy advances.

During the greater part of the first three months, besides the alteration already mentioned, it is felt lower in the vagina, and not unfrequently projecting a little forwards; but as soon as the uterus begins to rise into the abdomen, and leaves the pelvic cavity, as it does by the fifth month at farthest, sometimes a month earlier, its fundus leans forwards, and in consequence the os uteri is directed backwards; its margins are now felt very soft and relaxed, and we distinguish very generally within the circle of its orifice the cervical glandulæ slightly projecting, and feeling like little firm smooth vesicles rolling under the point of the finger. We can now also introduce the finger with great ease to a considerable depth into the cavity of the cervix, owing to the very yielding condition of the labia of the os uteri. From this period, in consequence of the rapid development of the uterus, and the shortening of the cervix, the os uteri rises in the pelvis, and is of course removed farther and farther from the external parts, while, at the same time, the anterior projection of the uterus increasing, its mouth is in the same degree directed backwards, so that, if we examine in the eighth or ninth month, we reach it with difficulty, and must expect to find it in the direction of the upper part of the sacrum. If gestation be drawing to a close, the orifice will often be hardly distinguishable, and when felt gives only the impression of an opening in a nearly flat surface, without any elevated margin, or at most very little, and feeling as a mere rugous opening in the mucous membrane of the upper part of the vagina.

But we must recollect, when we come to form an opinion from the existence of such changes in the os uteri, that there are other conditions of the uterus besides pregnancy by which they may be produced so as to assume almost exactly the characters of those that accompany the earlier periods of gestation. Thus, for instance, the near approach of menstruation and the accompanying irritation of the uterus may (and we have had repeated proofs from examination that it does) effect such a change in the form and texture of the os uteri. The same thing will happen in a more marked degree, when the organ becomes from any cause enlarged either by an increase of its substance, or still more remarkably when its cavity becomes distended by an accumulation of fluid within it, as of blood or water, or the presence of a diseased growth, such as a polypus or hydatids.* Moreover, in some women, especially those who have borne several children, the condition of the os uteri is at all times such as may but too easily impose on us. On the other hand, however, there is one fact on the subject on which we may rely,—viz. that inasmuch as pregnancy must always be accompanied with the physical changes of structure in the uterus already mentioned, should we find in a suspected or doubtful case, especially if supposed to be of some months' duration, the os uteri retaining distinctly the characters which belong to it in its unimpregnated state, that is, its transverse orifice with well defined and firm margins, we may conclude with certainty that the woman is not with child.

2. *Size of the Uterus, &c.*—When conception has taken place, the uterus almost immediately begins to increase in size, generally in every part, in consequence of the new action already described, but especially at the fundus. Here the cavity begins to increase its capacity, to enable it to receive and accommodate the ovum, which being accomplished, the upper part of the organ continues to increase in size in proportion to the growth of its contents. The fundus is first developed, then the body, and lastly the cervix; the latter part not being affected by the process of expansion until about the sixth month, as already stated. During the earlier months, therefore, the finger introduced per vaginam cannot reach sufficiently far to arrive at and detect the development which has taken place in the upper part of the uterus; and as the increase of size in the organ is not as yet such as to prevent its being still accommodated within the pelvis, it cannot be detected by examining through the parietes of the abdomen; wherefore, during this period, which extends through at least the first three months, the development of the organ or its degree will be difficult to ascertain, but will become gradually more easy of detection as pregnancy proceeds and the uterus enlarges. In general, by the end of the fourth month, the fundus of the uterus may be felt, especially in a thin person, overtopping the anterior wall of the pelvis. During the fifth it rises to half-way between the symphisis pubis and the umbilicus; and if an examination be made per vaginam, we can detect the enlarged uterus, which we encounter when we attempt to pass the finger between the anterior part of the cervix and the inside of the symphisis pubis,—a situation in which, when a woman is not pregnant, and even during the earlier periods of pregnancy, we are not able to feel any thing. At this period, also, we may at the same moment feel the fœtus by ballottement, as described in another section. In the sixth month the uterus rises as high as the umbilicus, which is now for the first time sensibly affected and begins to rise to a level with the surrounding integuments. In the seventh month the fundus uteri may be felt half-way between the umbilicus and the end of the sternum; and if an examination be made per vaginam, the finger readily detects the globular tumour of the uterus resting on the symphisis pubis, and within it the child's head; but the os uteri is now reached with greater difficulty, both because it is raised absolutely higher in the pelvis, and also because it is removed farther from the external parts by being projected more towards the promontory of the sacrum.

By the end of the eighth month the uterus has risen as high as the ensiform cartilage, and fills the whole abdomen, which is now very prominent and tense, and the umbilicus is in general not merely on a level with the integuments, but projects a little beyond them.

In the ninth month the uterus continues to enlarge, but the degree of its increase is not very observable by an increased elevation of its fundus, which on the contrary very generally falls lower towards the close of the month, so that for a week, or even two, before labour, the woman will appear and feel smaller than she was previously. If at this period we examine internally, the os uteri will in most cases be touched with great difficulty from its situation towards the upper and back part of the pelvis; there are in general no remains of the cervix; and the margins of the os uteri are felt thin, soft, and so relaxed that the orifice would receive with perfect ease the end of one's thumb, and within its circle we may feel the membranes.

Now it is important to notice the different degrees of distinctness with which these changes in the uterus may be recognised in different individuals, or in the same individual at different times, and to speak of the best method of conducting the examination.

In some women there is a natural stiffness and tension of the muscles of the abdomen, which is a great obstacle to an examination; and this they can produce or increase at pleasure, if they wish to baffle us in our investigation. In this, however, we may defeat them, by engaging them at the instant in conversation on some subject connected with their case which will be likely to set them talking. In other cases a similar difficulty will arise from inflation of the intestines or their distention by an accumulation of fæces; or a still more formidable bar may be found in a general condition of *embonpoint*, when the omentum and abdominal integuments may be so loaded and thickened with fat, that we can no more feel any thing through them than if we had a folded blanket between our hand and the patient's abdomen. This is so remarkable in some fat women, that we have found it impossible immediately

* In introducing hydatids here, we do not mean to be understood as considering them distinct from pregnancy, from which we believe they always arise, but as distinct from the natural conditions of that state, and from the presence of a fœtus.

after delivery to ascertain by external examination the degree of uterine contraction, although there were other satisfactory proofs of its perfection. We should not forget that this is a state of the abdomen very apt to occur at the turn of life, when, from the cessation of the catamenia, women very often fancy or affect to think themselves with child. On the other hand, the examination will be most satisfactory in women of a spare habit, and who have the abdominal parietes relaxed.

It was before stated that during the first three months we cannot expect much information from the altered size of the uterus, but that after the lapse of another month, the change might be ascertained both externally and also per vaginam; and it may be here added that in a case of doubt we may make these two modes of examination mutually confirmative of each other, by applying the finger of one hand to the os or cervix uteri, and pushing that part upwards, and then with the other hand gently pressing down the tumour felt in the abdomen. If we thus feel its descent upon the finger in the vagina, it affords almost certain proof that the tumour is the uterus in a state of enlargement. But we must again recollect that a certainty even of this will not be sufficient to assure us of the existence of pregnancy, because the enlargement may arise from other causes than the presence of a fœtus, such as hydatids, polypus, dropsy, or accumulated menses within the uterus, or scirrhous thickening of its substance. In the case of polypus or scirrhus, the great solidity of the organ would at once undeceive us; but in other circumstances we might be able to ascertain merely that the cavity of the organ was increased in capacity without being able to determine the exact course of its enlargement. At the same time the presence of several of the symptoms of pregnancy might afford a very strong moral conviction of the existence of that condition; while, on the other hand, we may discover such a want of correspondence between the state of the uterus and the other symptoms apparently indicating a certain period of pregnancy, as would be sufficient to decide our opinion on the negative side of the question.

We have already spoken of the mode of examining externally to discover the presence of a fœtus in utero, and alluded to another form of examination per vaginam, to which we ought to resort for this purpose. As we have no English name for this mode of examination, it is still designated by its French name.

Ballottement.—This mode of examination is thus to be instituted. The patient may be examined in the upright position, or placed lying with the shoulders much raised. One or two fingers are then to be introduced into the vagina and carried upwards until their points are applied to the anterior section of the cervix uteri, and as high up on that part as they can be conveniently made to reach without using force, and they must be carefully kept in constant contact with the part to which they have been applied. The other hand of the examiner is to be placed on the abdomen over the uterine tumour, which should be pressed downwards towards the cavity of the pelvis; instantly on our doing this, the fingers which have been kept applied to the cervix should be impressed against it with a quick and slightly jerking motion upwards, when something will be felt to have bounded away from the fingers, upon which it will, in the course of three or four seconds, be felt to drop again with a gentle pat.

Should this be distinctly felt, it is proof positive of a fœtus in utero, there being no other condition or disease of the organ in which a solid body can be felt in this way floating in its cavity; and it possesses this great advantage over many other modes of investigation, that it is equally applicable to the dead as to the living fœtus. But we must be prepared for occasional disappointment in this test as in others, inasmuch as the most carefully conducted examinations of this kind have failed of success when there was really a fœtus in the womb of sufficient bulk to be thus felt, as we have ourselves experienced. This difficulty may arise in some cases from the fœtus being unusually small, or from the cervix being unusually long; and in some instances we were satisfied it has arisen from the uterus lying too much beyond the reach of the finger at the time of the examination.

The time at which we may resort to this examination with the best prospect of success is generally said to be from the fourth to the sixth month. Our experience leads us to say that it is not likely to be satisfactory until after the end of the fourth month, but from that till the end of the sixth it will be found most available, and often completely decisive.* In the earlier periods of pregnancy the fœtus is too light to be felt, and in the more advanced its presence is ascertainable by other means, and besides it is then too large and too much confined to be made to float or move about thus freely.

It is desirable that the bladder and rectum should be quite empty when we make this examination, that the uterus may have as much space as possible for its descent into the pelvis, and so be brought as much as possible within reach of the examiner's finger. We must be careful not to mistake the movement of the uterus for that of the fœtus, an error into which we shall be particularly liable to fall if we remove the fingers from their contact with the cervix while making the examination. In one instance of enlarged uterus we knew the pulsation of one of the arteries to be mistaken for the drop of the fœtus on the finger.†

Application of Auscultation.—Since the appearance of the memoir of Dr. Mayor (Vide Bibliothèque Universelle, Nov. 1818) of Geneva, in 1818, and the subsequent observations of Kergaradec and Laennec, the application of auscultation as a means of detecting pregnancy has been much cultivated, and with results highly benefical to the interests of science and our powers of making a correct diagnosis.

The phenomena thus ascertainable are, the pulsations of the fœtal heart, and a peculiar sound audible in that part of the uterus to which the placenta is attached, and hence called the placental sound or murmur (*bruit placentaire*). We

* Gardien specifies four months and a half; Gooch from the fifth to the seventh.

† On this subject see *Baudelocque*, tom. i. p. 206.—*Desormeaux*, Dict. de Méd. tom. x. p. 400.—*Velpeau*, Traité des Accouchemens, tom. i. p. 185—*Gooch*, On Female Diseases, &c. p. 215—*Gardien*, Traité Complet, &c. tom. i. p 507-10.—*Mahon*, Méd. Leg. tom. i. p. 160. note by Fautrél.

shall first consider the modes of investigating these, and then state the advantages which this mode of examination enjoys above others, and the defects under which it labours as a general means of diagnosis.

The placentary sound is the one first capable of being examined, and may be heard as soon as the uterus has become sufficiently developed that its fundus shall have risen above the anterior wall of the pelvis: this happens in the fourth month of gestation, before which period we do not believe the placental sound can be ascertained. We are aware that cases are recorded in which it was supposed to have been heard so early as the tenth week. If so, we have not been so fortunate as others, although we have very many times indeed carefully repeated our examinations, but never succeeded until four months of pregnancy had been completed.*

The characters of this phenomenon are, a low murmuring or somewhat cooing sound, resembling that made by blowing gently over the lip of a wide-mouthed phial, and accompanied by a slight rushing noise, ("Battement simple avec souffle." —*Kergaradec,*) unaccompanied by any sensation of impulse. This sound is in its returns exactly synchronous with the pulse of the mother at the time of examination, and varies in the frequency of its repetitions with any accidental variations which may occur in the maternal circulation. Its situation does not vary during the course of the same pregnancy; but in whatever region of the uterus it is first heard, it will in future be found, if recognised at all, for it is liable to intermissions; at least we shall occasionally be unable to hear it where we have already heard it a short time before, and where we shall shortly again recognise it. In relation to the regions of the abdomen, its seat will of course vary in proportion to the progressive advance of the pregnancy. According to our experience it will be most frequently heard about the situation of the fallopian tube of the right side, but it may be detected in any of the lateral or anterior parts of the uterus.

[It is questionable, however, whether this sound be ever produced except by pressure on the large dorsal vessels of the mother. It is, indeed, positively affirmed, that the sound has been heard in cases of uterine and other tumours where there was no pregnancy. (Raciborski, *Manual of Auscultation*, by Fitzherbert, p. 145, Lond. 1835. E. Rigby, *System of Midwifery*, Amer. edit. Philad. 1842. Hope, *Treatise on Diseases of the Heart*, by Dr. Pennock, Philad. 1842: and Prof. Huston, in Amer. edit. of Churchill's *System of Midwifery*, p. 136 (note), Philad. 1843.) In one case of fibrous tumour of the uterus, the writer heard it distinctly.]

The other phenomenon differs in every one of its circumstances from the placentary murmur. It results from the contractions of the fœtal heart, which, when conveyed to the ear, are heard as rapid pulsations without any of the murmuring sound of the *bruit placentaire.* These pulsations vary in number from 120 to 160 in the minute, while the mother's pulse at the same time may not exceed the usual standard; and should it happen to do so, the pulsations of the fœtal heart will not be found similarly affected. By this want of correspondence, and permanently greater rapidity, they are distinguished from the pulses of the mother. The impulses of sound communicated to the ear are in general very delicate and feeble, resembling very much the ticking of a watch heard through one's pillow at night.† This phenomenon is not ascertainable, according to the writer's experience, until five months of pregnancy have been accomplished,‡ and then requires for its recognition very great attention on the part of the examiner, and also a practised ear. As pregnancy advances, the sound becomes more distinct. Its seat or source being the heart of the fœtus, and the fœtus having in most women a great disposition to change its posture, the situation of the sound will consequently be different at different times, especially from the sixth to the eighth month. It is, however, most frequently and most readily heard at one or other side, and at about the middle of a line drawn from the umbilicus to the anterior and inferior spinous process of the ileum, and more frequently at the left side than at the right.

The mode of ascertaining the existence of pregnancy has this great advantage over almost every other, that it detects not only the presence of a fœtus, but proves its life also. On the other hand, however, should life be extinct, auscultation cannot possibly afford us any information; and here lies the great defect under which its application labours when compared with other modes of examination, to which also it is inferior in not being available during that period of pregnancy which is most obscured by doubt. Again, from the fact that both phenomena are occasionally inaudible (see case related in the section on *Quickening*, &c.) even in the case of a living and healthy fœtus, it will not justify us in giving a negative opinion. The bruit de cœur once heard is of course decisive, because there is no other sound which can be mistaken for it; but not so with the placental murmur, which may be so imitated, either artificially, as by pressure, or by disease, that the nicest and most practised ear cannot detect any difference. A case most strikingly illustrative of this statement was not long since under the writer's care, in which enormous enlargement of the uterus, of that kind which has been called vascular sarcoma, was accompanied by this phenomenon in its most perfect condition; and in another case of abdominal tumour (supposed to be of the spleen) pressing on the aorta this sound was equally distinct: moreover, it may at any time be imitated by pressing the end of the stethoscope over the region of the iliac vessels.

At all times this kind of examination requires great care and niccty on the part of the examiner, and complete silence around him, for the sounds are very often almost imperceptible. We have

* "Je ne l'ai rencontré que dans la seconde moitié de la grossesse. Si Laennec et M. de Leus, qui disent l'avoir reconnu avant la fin du troisième mois, ne se sont pas mépris, il me paraît par cela seul impossible de l'attribuer à la circulation utéro-placentaire." *Velpeau*, Traité des Accouchemens, vol. i. pp. 190-1.

† "—semblable à celui que font entendre les battemens d'une montre enveloppée de beaucoup de linges." *Velpeau.*

‡ "Ces pulsations s'entendent distinctement des le sixième mois, et quelquefois même un peu plus tot." *Laennec*, tom. ii. p. 457.

the very highest authority for believing that the formation of a correct judgment by their means requires more care, and is beset with greater difficulties than are found in investigating all the diseases of the chest.* We must recollect that, from their occasional intermission, it may happen that we shall not be able to give a satisfactory opinion until we have several times repeated our examination. To make this examination, it is by no means necessary that we should be practised stethoscopists, or even use the stethoscope at all, since the naked ear will detect the sounds sought for with perfect accuracy; but the use of the tube is for many reasons preferable.

It appears not unimportant to mention here, that our success will sometimes depend on our making a proper degree of pressure with the end of the instrument, since the seat of the sound which we seek to discover may not, and very often is not, in contact with the surface on which we apply our ear or our stethoscope; and under such circumstances the intervention of a fluid, such as the liquor amnii, will effectually prevent the transmission of the sound, until, by gently increasing the pressure on the integuments, we carry them inwards, and by displacing the intermediate fluid, whether air or water, we bring them into more immediate contact with the source of the sound, and obtain a solid medium for its transmission.†

Substances expelled from the Uterus. — The expulsion from the uterus of solid or organized substances, presenting occasionally very unusual or anomalous characters, excites not unfrequently suspicions of the existence of pregnancy in the unmarried, and perhaps the perfectly chaste. Under such circumstances we may be applied to for an opinion as to the nature of the substance expelled, and are expected to declare whether it is or is not the product of conception. Inasmuch as character and fair fame of the individual depend on our answer, the greatest care will be required in making such an examination, and the utmost caution in forming or pronouncing an opinion. To this duty no person can possibly be competent if he have not previously made himself intimately familiar with the appearance and structure of the ovum, particularly in the earlier periods of its formation; and this knowledge he may take it for granted he never will attain to by descriptions in books or plates, nor by any means except repeated examinations of the structure itself under every circumstance and condition in which it may be found: more especially when it is altered in its characters, as it usually is, by abortion.

The substances thus expelled may be, 1. an early ovum; 2. a mole; 3. uterine hydatids; 4. the membrane produced in dysmenorrhœa; to each of which we shall now turn our attention.

1. *An early Ovum.* — When the product of conception is expelled within a month from the time of conception, the most careful and skilful examination may fail in detecting its true character. After this period its structure is sufficiently distinct to be recognised by any one well acquainted with it, and who will take *sufficient time* to examine it; for this also is absolutely essential to the formation of a correct opinion. The ovum, when thus expelled, is generally infiltrated with firmly coagulated blood, and the pressure which it sustains while it is forcing its way through the contracted and rigid cervix of the uterus, so condenses its texture as to reduce it apparently to the condition of a solid homogeneous mass. The real structure of the body cannot be ascertained by any examination instituted at the moment, but must be gradually made out by first immersing the substance in water for a day or so; and then, by agitation and washing, the coagulated blood must be removed, while with delicate blunt instruments we gently separate the component parts of the

* "L'étude des phenomènes dont nous venons de parler dans cet article demande incomparablement plus d'attention que celle de tous ceux que présentent les maladies de la poitrine." *Laennec*, tom. ii. p. 466.

† The author of the article AUSCULTATION in the first volume of the present work, gladly avails himself of the present occasion to correct some mistakes which he has committed in respect to the appropriation of certain opinions therein advanced.

In treating of the utero-placental circulation, with reference to the variety of sounds which accompany it, we gave it as *Dr. Ferguson's* opinion that "the most constant variety is a combination of the bellows or sawing, with the hissing sound, commencing with one of the former and terminating with the latter;" and in another place we stated that "*Dr. Ferguson* had not observed any variety of the sounds to be peculiar to particular stages of pregnancy." Now the fact is that both these remarks belong to *Dr. Kennedy*, and are taken from an excellent paper by this gentleman, published in the fifth volume of the *Dublin Hospital Reports*. In transcribing the extracts which we had made, we inadvertently inserted Dr. Ferguson's name in place of Dr. Kennedy's, and referred to a paper by the former gentleman in the *Dublin Medical Transactions*, from which we also had been making extracts. We are much obliged to Dr. Kennedy for having enabled us to correct our mistake.

In respect of certain other statements made by us in the same article, we most readily afford Dr. Kennedy the opportunity of giving his own explanation by extracting a passage from a communication with which he has favoured us.

Extract of a letter from Dr. Kennedy to Dr. Forbes:

"You appear to have misunderstood me when you state 'there seems little ground for believing with Dr. Kennedy that the placental arteries themselves have a share in the production of the sound any farther than by their action promoting that of the uterine arteries.' Now if you will refer to p. 241 of my paper you will find that I merely deem it possible that the passage of the blood through the arterial tubes and cells of the *maternal part* of the placenta may have *some effect* in producing it; and p. 244, in speaking of the *possibility* of its operating so, add that the point *still admits of doubt*. From this it will be seen that I by no means commit myself, either in the manner or to the extent that your statement implies. The fact is, that although my explanation may not have been sufficiently explicit on this point, yet the manner in which I endeavoured to explain the maternal part of the placenta's assisting in producing the soufflet (if it did so at all), was that which you more distinctly state, namely, by promoting the action of the uterine arteries. But even of this I was not, nor am I as yet quite satisfied. I however thought myself called upon candidly to state facts and inferences as they presented themselves to me on my investigation, leaving it to others to draw what conclusions they thought proper from them.

"There is still another point to which I wish to draw your attention, as, from the manner in which you quote me, my meaning is very equivocally conveyed. You say, 'Dr. Kennedy denies M. Ollivry's statement, that the soufflet is immediately extinguished on the removal of the placenta, the death of the fœtus, and the tying the cord, the sound becoming abrupt,' &c. From this it might be concluded that I stated the soufflet always to continue after delivery, death of the fœtus, &c. an inference widely at variance with the fact, and such as was never intended by me. You will find, p. 244, Dub. Hos. Rep. vol. v. the passage which you quote: it runs thus: 'Neither does the sound (the soufflet) *invariably* cease, as we might be led to conclude on the authority of Dr. Ollivry, on the separation or expulsion of the placenta; but provided the uterine arteries at this part, from imperfect contraction of the uterus, continue pervious to blood, a soufflet will still continue,' &c. Here you will at once perceive how much the words 'immediately extinguished,' in place of 'invariably cease,' affect the nature of the statement."

May, 1833. J. F. *Edit.*

mass *under water*, until at length we ascertain its real character. This process may occupy us for a time varying from three or four days to a week, before we are able to satisfy ourselves perfectly. Haste may completely defeat the object of the examination.

If in the progress of such an investigation we discover a fœtus, or even a part of one, it would of course be decisive; but this may not be the case, and yet we may recognise all the other component parts of the ovum presenting several structures which are never produced by disease.* First, we may have the decidua covering either partially or completely the substance under examination, distinguished by its soft, rich, pulpy appearance and strong red colour, its external or uterine surface rough and unequal, and, when well freed from the coagulated blood, exhibiting numerous small round foramina, (see Hunter's plates of the gravid uterus, xxix. fig. 11, and also plates xxviii., xxx., xxxiii., xxxiv.), capable of admitting a pin: its internal surface is smooth, and exhibits little or no appearance of these openings. This coat may be found attached to the ovum, or entirely torn away and separated from it during its expulsion; but in either case these characters mark the true decidua, and are not found in the products of disease. Within this outer coat another is found immediately investing the membrancs of the ovum, the outer surface of which is smooth, and its inner completely filamentous, receiving the beautiful arborescent villi which cover and shoot from the surface of the chorion, forming the bond of union between it and this inner decidua. The discovery of these arborescent villi or capillaries is proof positive of the nature of the product, as they are never found presenting like characters, except upon the chorion or uterine surface of the placenta.

2. *Moles.* — With regard to those solid fleshy masses called moles, which are occasionally expelled from the uterus, there is a great discrepancy in the opinions of writers of authority, some of whom maintain, with Mauriceau,† that they are the result of conception alone, and of course positive proofs of pregnancy; while others either think this very doubtful, or deny it altogether, and suppose that they are merely accidental formations of a morbid character. "By the term *mole*," says Denman, (Introduction to Midwifery, p. 124), "authors have intended to describe very different productions of, or excretions from, the uterus. By some it has been used to signify every kind of fleshy substance, particularly those which are called *polypi*; by others, those only which are the consequence of imperfect conception when the ovum is in a morbid or decayed state; and by many, which is the most popular opinion, every coagulum of blood which continues long enough in the uterus to assume its form, and to retain only the fibrous part as it is properly called, is denominated a mole." — "True moles," says Voigtel, (Hand buch der Pathologischen Anatomie, vol. iii. p. 501), "are distinguished from the false and other growths of the uterus by their not deriving their origin from the substance of the womb or its membrane; but by their being always the consequence of conception." This is at once assuming that conception is the sinè-quâ-non without which a mole cannot exist,—an opinion which is supported, to a certain extent at least, by the experience of Mr. Burns, who says, "It is the opinion of many that these substances are never formed in the virgin state, and no case that I have yet met with contradicts the supposition." (Principles of Midwifery, ed. 7, p. 111). Foderé (Médecine Légale, vol. i. p. 468) thinks that the true mole is always the result of intercourse between the sexes, and that those substances which are discharged from the virgin uterus are merely condensed coagula of blood, which of course may form in the chaste as well as others. Baudelocque (Art. des Accouchemens, tom. ii. p. 367) considers the mole and the false conception as one and the same.

On the other hand, we find the matter thus stated by Dr. Smith: "Moles are disorganized masses that form in the uterus; and continuing for some time to increase, cause some of the symptoms of pregnancy. They have been found in females who never had any intercourse with the other sex." (Principles of Forensic Medicine, p. 298). Ruysch makes a similar assertion, and adds that he has seen them in women so advanced in years as to be beyond the reach of suspicion. A case came before the parliament of Paris in 1781, in which the female sued for damages for seduction. Twenty months after this was alleged to have been committed, she brought forth a mole. The parliament decided against her on the score of character, and they added that "the causes of moles were as uncertain as the time of their gestation, *and that there were instances of girls, and even of nuns, who had produced moles without any previous criminal connection.*" Foderé, who quotes this case, disapproves altogether of the view taken by the court. (Médecine Légale, t. i. p. 478).

It is to be observed here that this is a mere question of fact, of which different views have been taken, and opinions formed by authors or practitioners according to the opportunities afforded them of judging. The writer does not feel prepared to undertake to reconcile these conflicting opinions, but it appears to him almost certain that much of the discordance has arisen from substances of very different characters having been indiscriminately classed together under the general term of moles, some of which were undoubtedly neither more nor less than diseased ova, or remnants of such, while others were as certainly either merely condensed coagula, or perhaps uterine polypi. Hence Mahon (Mahon, Médecine Légale, t. i. p. 274) appears perfectly justified in making the following remarks:—"The existence of moles properly so called is extremely doubtful, since they may all be referred to some one or other of the substances of which we have spoken, viz., a placenta which had continued its growth, the fœtus having perished; the degenerated remains of the after-birth; coagulated blood; sarcomatous

* See a case related by Mr. Lemon in the Edinburgh Medical and Surgical Journal, vol. xi. p. 96. The writer has in his museum more than one specimen illustrative of this absence of the fœtus where the other parts of the ovum exist.

† "Il est très certain que les femmes n'engendrent pas de moles ni de faux germes, si elles n'ont usé du coit." Maladies des Femmes, tom. i. p. 109. "Massa carnea, vasculosa, ex utero excreta. Ovum deforme." *Vogel.*

tumours or polypi of the uterus. The two first cannot exist except after sexual intercourse; the other three may be found independently of it.* This is the distinction which it is of the greatest importance to make in questions of legal medicine, that we may not without cause compromise the reputation of the unmarried girl or the widow of irreproachable life and conduct."

In this view the writer entirely coincides, and thinks the medical jurist would not be justifiable in pronouncing any such mass expelled from the uterus as proof of pregnancy, except he can detect in it either the fœtus or a part of it, or some other of the component structures of the ovum.† In the instances which have come under our immediate observation, the women were all either married or avowedly indulging in sexual intercourse, and the masses expelled, when examined, were found to contain the product of conception degenerated or greatly altered by disease. The last of these substances which came under our observation was expelled from the uterus immediately after the discharge of a healthy ovum, containing a well-formed fœtus of four months, at which period of pregnancy the woman, according to her own account, had arrived. The substance had the external characters usually considered as those of a mole, and was of the form and size of a large orange. When opened, no trace of a fœtus could be discovered, but there was a small remnant of an umbilical cord, which was ragged at its unattached extremity: the fleshy envelope varied in thickness from an eighth to half an inch, the thickest part being that where the placenta was situated, the internal surface of which exhibited very remarkably the tubercular disease represented in Denman's ninth plate. (It is preserved in the writer's museum.) Morgagni (Epistles 48–9) relates a similar case, and quotes Hartman and Gutterman. Mr. Lemon's case has been already referred to.

3. *Uterine hydatids.*—Of the nature of these productions, and their necessary connection or otherwise with conception, there exists, as in the case of fleshy moles, a complete want of accordance in the opinions of authors. Some maintain that they are not necessarily the result of conception, while others as strongly, and, as it appears to us, with much greater reason and truth, consider them as the product of disease attacking the ovum. Without entering into lengthened details on this subject, it appears proper to quote a few of the most respectable opinions on each side of this question before stating the result of our own experience on the subject. Dr. C. M. Clarke (Observations on the Diseases of Females, part ii. p. 115) thus expresses himself:—"It is probable that the existence of pregnancy is not necessary for the production of this disease. It has been believed to exist independently of this state; and perhaps a morbid condition of organized lymph may have the power of originating this disease under certain circumstances, but what these circumstances are is not known." Gardien's opinion is that "hydatids may be met with in girls as well as women; however, although they are independent of sexual intercourse, they are much more frequently met with in women who have borne children, and especially when they have arrived at the turn of life." (Traité complet, &c. t. i. p. 559.) Denman says:—"These have been supposed to proceed from coagula of blood, or portions of the placenta remaining in the uterus, and this opinion is generally true: but there is sometimes reason for thinking that they are an original production of the uterus independent of such accidental circumstances, and sometimes the precursors of organic disease in that part." (Introduction to Midwifery, fifth edition, p. 121.) Of these opinions we think we are justified in saying at least that there is so much of conjecture in them that they weigh very little in the determination of this point; and it is, moreover, to be observed that these writers admit elsewhere, as indeed do all who have written on the subject, that the existence of hydatids in utero is always accompanied by the ordinary symptoms of pregnancy. The weight of authority appears to us very decidedly in favour of the necessary connection between these substances and previous conception. Beck declares that he "can find no case on record where hydatids of the uterus have been formed *independent of sexual connection*." (Elem. Med. Jurisp. p. 102.) Baudelocque and Voigtel consider them merely as a variety of the mole, and as such the result of impregnation. (Locis citatis.) Desormeaux thus speaks of them: "It is superfluous to say that the development of these masses of hydatids is most frequently, if not always, the result of conception: at first it is impossible to distinguish this affection from pregnancy, *or, to speak more correctly, pregnancy exists* with all its phenomena, and it is impossible to discover when the degeneration into hydatids takes place." (Article "Œuf humain," Dict. de Méd. t. xv. p. 387.) Velpeau is perhaps even more decisive on the point: his words are, "the mole and hydatids of the uterus being but the products of conception degenerated, give rise to the same phenomena as true pregnancy." (Traité Elém. de l'Art des Accouch. t. i. p. 217.) We shall quote only one other authority, to which, however, we attach very considerable value. Madame Boivin has published a very ingenious and satisfactory pamphlet (Nouvelles Recherches sur l'origine, la nature, et le traitement de la Mole Vésiculaire ou Grossesse Hydatique, 1827) expressly on this subject, in which she brings forward a vast quantity of information connected with this affection, which she appears to have studied with unusual attention; and the result of her observations she announces to be that hydatids in the uterus are in all cases the result of conception. (Vide pp. 15, 24, and 56, Op. cit.) She notices the fact that these formations are not attached immediately to the internal surface of the uterus, but are sur-

* "Aussi sont-ce les seules productions que l'on rencontre chez les filles, et chez les femmes vivans dans l'état de chastité." Mad. Boivin sur la Mole Vésiculaire, &c. p. 18.

† It has been already remarked that these are not unfrequently found without any part of a fœtus. This is noticed also by Voigtel in describing different species of moles. "In others," he observes, "from an originally imperfect development of the ovum, or an injury to the fœtus at its first formation, it appears either as a shapeless mass, or *the fœtus itself is completely destroyed*, and *only its membranes and the placenta* continue to grow for a time and get thickened and fleshy, or filled with fluid only, or form membranous, fibrous masses, or hydatids, or assume other unnatural appearances." Voigtel, Op. cit.

rounded by an investing membrane having all the characters of the *decidua vera;* and she maintains that the hydatids originate in the filamentous vessels which spring from the external surface of the transparent membranes of the ovum; in regard to both which points we coincide in her views, and have in our possession preparations showing both facts. Our own belief, then, is that uterine hydatids do not occur except after sexual intercourse, and as a consequence of impregnation. We never met or heard of a case in which their presence was not accompanied or preceded by the usual symptoms of pregnancy; (such also was the experience of Dr. Gooch. See Account of the Diseases of Women, &c. p. 242–3;) and in every instance under our immediate observation, the women supposed themselves with child, and when the contents of the uterus were expelled, there was found either a blighted fœtus or some other part of the ovum.

It may not be amiss to notice here an argument from analogy which has been brought forward against this view of the question, viz. that hydatids being formed in other situations, as the brain, &c., why may they not occur in the uterus also, independently of any such circumstance as intercourse or conception? To this we would reply, first, that the hydatids produced in the situations alluded to differ, *toto cœlo*, in their characters from those of the uterus; and, secondly, that whenever hydatids are formed, it is always in connection with serous membranes, which do not exist in the uterus until the ovum is deposited there, whose membranes are essentially serous. Still it must be confessed that our knowledge on this point is by no means sufficiently precise, nor our collection of facts sufficiently extended, to warrant us in pronouncing positively on the question, or asserting decidedly, in a case of suspicion, that a woman was pregnant merely because she discharged hydatids from the uterus, except we could detect along with them some constituent part of the ovum, or in an examination after death find in the ovary the true corpus luteum, which ought to put an end to all doubt. It would be presumptuous and absurd to maintain that, because we had always found them in connection with one particular cause, there might not be some other also capable of producing them; and as there may be a doubt, we must let the accused have the benefit of that doubt. Again, in giving an opinion we should be prepared to make allowance for such a case as this: a woman loses her husband by death or departure, when she is, perhaps, in the third or fourth month of pregnancy; shortly afterwards she miscarries, and the placenta or some other portion of the ovum is retained, and gives rise to the production of hydatids. This new product may be retained for many months,* and being then expelled, might very unjustly excite suspicion against a perfectly chaste person: for, although the result of impregnation in such a case, they might obviously be no proof of a pregnancy occurring subsequently to the absence of the husband.

3. *Membranes expelled in dysmenorrhœa.*— The circumstances attending dysmenorrhœa have sometimes given rise to a suspicion of pregnancy and early abortion, because the female may have pains resembling those of labour, accompanied by red discharge, and followed by the expulsion of a substance somewhat resembling the decidua. But it only requires a little examination and inquiry into circumstances to detect the difference between these two products and the real nature of the case. In the first place, we learn that such occurrences are habitual with the person at every menstrual period; the symptoms of pregnancy have not been observed; nor does the state of the breasts correspond to the existence of that condition. Again, the substance expelled in such cases will be found deficient in several of the characters of the true decidua: it is thin, flimsy, and very unsubstantial in its texture, and has not the vascularity, nor the foramina for the reception of the nutrient vessels from the uterus, which are so distinctly observable in the decidua vera; and lastly, the most accurate examination will not discover within it any of the transparent membranes of the ovum. We cannot more appropriately close these observations on this membrane than by quoting the opinion of Denman, who, of all the moderns, has best described it. "As the first cases in which this membrane was discharged were those of married women, a doubt arose in my mind whether it was not really a consequence of early conception: but I have lately had the most undoubted proofs that it is sometimes discharged by unmarried women, and may be formed previous to and without connubial communication; and that the uterus has occasionally or constantly, in some women, the property of forming it at or in the interval between the periods of the menstrual discharges. It seems particularly necessary to establish this fact, as the appearance of this membrane has more than once given rise to erroneous opinions and unjust aspersions. Nor is this the only circumstance in which some women, at each period of menstruation, have symptoms like those which accompany pregnancy or parturition." (Introduction to Midwifery, pp. 161–2.)

Accidental Circumstances. — Under this head it is intended merely to notice certain peculiarities sometimes observable in pregnant women, which, although generally deserving but little attention in such an investigation, may still be remembered with advantage on account of the constancy with which they occur in particular individuals, and the assistance which they may consequently afford in confirming or modifying our opinion. Such is, for instance, the alteration so often observed to take place in the features and expression of the face, which has been made a subject of remark since the days of Hippocrates, who mentions it. The features of the face in general become sharper, especially the nose, which seems as if it were lengthened, and the mouth appears larger; the eyes are sunk, and often surrounded with a brownish or livid areola, and assume a languid expression. A marked change in the temper is very commonly observed also, so that a woman who was under ordinary

* In Madame Boivin's work, p. 74, there is a table showing the number of months which intervened in thirty-two cases between the commencement of pregnancy and the expulsion of the hydatids. Some interesting cases are detailed by Nanche in a well-written article on this subject. See Maladies propres aux Femmes, partie i. p. 182.

circumstances extremely mild and sweet-tempered, becomes, when pregnant, irritable and capricious. Strange appetites and antipathies are well known as frequent attendants on pregnancy in many persons, some of whom will long to eat unusual and even revolting articles, while others, immediately after conception, are seized with an unconquerable aversion to species of food which were previously particularly agreeable to them. We have seen several well-marked instances of this, and in particular one, in the case of a lady who assured us that she always knew when she was with child by feeling a violent antipathy to wine* and tea, which at other times she took with pleasure. We had an opportunity of observing the accuracy of this indication in three successive pregnancies of the lady alluded to. (See Gardien, tom. i. p. 485. Burns's Principles of Midwifery, p. 231. Denman, p. 232.) The occurrence of pains in the teeth, face, and other situations, are with some the invariable accompaniments of pregnancy. In some women the same condition develops very singular idiosyncrasies, such as the occurrence of dark blotches over the face and other parts of the skin, an instance of which is at present exhibited in a patient under the writer's care. Lecat relates the case of a woman whose face in three successive pregnancies became quite black. (See other instances by Gardien, loc. cit.) Camper observed the same circumstance. The occurrence of salivation in consequence of pregnancy has been already noticed. Some women always have varicose veins during gestation, who are not subject to such an affection at any other time. Mr. Ashwell mentions that in some individuals frightful dreams have been found a very good diagnostic sign; and he informs us that Dr. Haighton used to relate the case of a lady under Dr. Lowder's care, who was compelled to hire a nurse to awake her when her countenance became very much discomposed. (Treatise on Parturition, &c. p. 171.) A very curious case is recorded by Dr. Benneewitz in Osann's Clinical Report for 1823, of a young woman who in three successive pregnancies was affected with diabetes mellitus which completely ceased after delivery, but always returned when she again conceived. (Edinburgh Med. and Surg. Journ. vol. xxx. p. 217.) In first pregnancies we can gain little or no information from such accidental peculiarities, but their constant occurrence in successive instances ought to give them value in our eyes; the degree of value, however, must depend altogether on the distinctness with which we can ascertain their existence, or the reliance which we can place on the sincerity of those who report them to us. (See Mahon, tom. i. p. 162.)

The Blood, Urine, and Pulse.—It is very generally asserted that the blood of pregnant women *always* presents the buffy coat and other characters of inflammation, (see Blackhall on Dropsies, p. 279–80. Scudamore on the Blood, p. 148,) and this change in that fluid is even noticed by authors as one among the rational evidences of pregnancy. (Gardien, vol. i. p. 487.) The very general belief in this as a fact established, has probably arisen from the circumstance that pregnant women are seldom bled except when labouring under some form of inflammatory disease; but experience has fully taught us that no reliance whatever can be placed on the condition of the blood as an evidence of pregnancy. It is quite obvious that a woman exhibiting many of the symptoms of pregnancy, and yet not with child, may have her system under the influence of inflammatory action sufficient to cause the appearance of the blood frequently noticed in pregnancy; and on the other hand the blood of pregnant women will be very often found not presenting the characters supposed to be peculiar to it. This we have seen proved in several instances, and perfectly recollect the first case which particularly arrested our attention on this point; it was that of a very fat and robust woman who was seized with puerperal convulsions, and her blood exhibited not the least trace of inflammatory character. We have observed the same absence of such an appearance in blood drawn in the earlier periods of gestation to prevent abortion; and within the last few days we witnessed a very satisfactory instance of the same kind in the case of a lady in the ninth month of pregnancy, whom we judged it expedient to bleed for a very distressing cough accompanied with pain in the chest and great irritation of the bladder; the abstraction of blood gave her the most immediate and decided relief, but it appeared in every respect perfectly natural and healthy.

A peculiarity in the urine of pregnant women has long been a matter of popular belief; and Savonarola, who wrote in 1486, gives a minute detail of the changes which that secretion undergoes in the different periods of pregnancy: up to about the sixth month, according to this writer, "the urine is clear, and of a pale citrine colour, with a cloud on its surface; and about the middle of the fluid, a deposit like carded wool; but as pregnancy advances towards its close, the urine becomes redder and turbid when stirred." This condition of the urine Foderé thinks entitled to consideration, having, as he says, "verified the accuracy of the observation." (Méd. Légale, tom. i. p. 435.) Still more recently M. Nanche has brought this subject before the profession. (See the Lancette Française; also the Lancet, No. 417, p. 765.) He speaks of it as a discovery of his own, and does not appear to be aware of the observations previously made by others: his words are: "By allowing the urine of pregnant women or of nurses to stand for some time, in thirty or forty hours a deposit takes place of white, flaky, pulverulent, grumous matter, *being the caseum or peculiar principle of milk formed in the breasts during gestation.* The precipitation is more readily procured by adding a few drops of alcohol to the urine." To this observation he subjoins a very strong case, in which he ventured to affirm the existence of pregnancy in a woman who was subsequently examined, both per vaginam and with the stethoscope, by several medical men, and pronounced not to be with child; but her delivery shortly afterwards evinced the accuracy of his previous diagnosis. The editor of the Lancet informs us in a note, that he had "applied the test in one case, and found it perfectly correct." We

* This particular aversion is expressly noticed by Hippocrates as a sign of pregnancy, "vinum odio habent cibos aversantur." De infecundis, cap. 6.

have ourselves tried it in several instances, and the result of our trials has been this; in some instances no opinion could be formed as to whether the peculiar deposit existed or not, on account of the deep colour and turbid condition of the urine; but in the cases in which the fluid was clear, and pregnancy existing, the peculiar deposit was observed in every instance; and we think its appearance would be best described by saying that it looks as if a little milk had been thrown into the urine, which having sunk through it, had partly reached the bottom, while a part remained suspended and floating through the lower part of the fluid, in the form of a whitish, semi-transparent, filmy cloud. And in some cases in which pregnancy was suspected, but did not exist, no such deposit was observed; but it is superfluous to say that there is such a host of accidental causes capable of altering the condition of the urine as ought to make us very cautious indeed how we ventured to attach credit to a symptom so equivocal.

We may apply the same observation to the state of the pulse, which has been made a subject of remark since the days of Galen. We shall only observe that in pregnant women the pulse is almost always stronger and more rapid than is natural to the individual at other times; but we cannot tell in a particular instance what may be the exciting cause of the increased action; we cannot even be sure that it is not natural to the person, and at all events we are certain that there are a thousand circumstances of disease or accident which may equally produce it.

[Although a difference has been found to exist between the urine of an impregnated and that of an unimpregnated, female, it has not generally been found distinctive. M. Donné, indeed, (*Gazette Médicale de Paris*, 29 Mai, 1841, and *Cours de Microscopie*, Paris, 1844,) affirms, that during pregnancy it contains less uric acid, and phosphate of lime, than in the natural state,—a difference which may be accounted for, on considering the elements that are necessary for the formation of the organs of the fœtus. The crystallization of the salts of the urine is thus so remarkably modified, that by simple inspection, without examining the females, he has, in more than thirty cases, recognised the state of pregnancy at different periods. Of late years, the urine of the pregnant female has been found to contain a peculiar substance, which, when it is allowed to stand, separates and forms a pellicle on the surface. To observe this, the urine must be allowed to stand from two to six days, when minute opaque bodies are observed to rise from the bottom to the surface of the fluid, where they gradually agglomerate, and form a continuous layer over the surface, which is so consistent, that it may be almost lifted off the urine by raising it by one of its edges. To this pellicle, the name *Kiestein*, or more properly *Kyestein* (from κυειν, 'to be pregnant') has been given. It is whitish, opalescent, slightly granular, and may be compared to the fatty substance, which swims on the surface of soups, after they have been allowed to cool. When examined by the microscope, it has the aspect of a gelatinous mass without determinate form: at times, cubical crystals are observed in it, but this appearance is only seen when it has stood for a long time, and may be esteemed foreign to it. The kiestein remains on the surface for several days; the urine then becomes turbid, and small opaque masses are detached from the kiestein and fall to the bottom of the fluid: the pellicle then soon becomes destroyed. Various experiments have been made on this matter by Nauche (*La Lancette Française*, and *Lond. Lancet*, cxvii. 675;) Eguisier, (*Ibid.* Février 21, 1829, and *L'Expérience*, 25 Juillet, 1839;) Dr. Golding Bird, (*Guy's Hospital Reports*, April, 1840;) Mr. Letheby, (*Lond. Med. Gaz*, Dec. 24, 1841;) Dr. Stark, (*Edinb. Med. and Surg. Journ.*, Jan. 1842;) Dr. E. K. Kane, of Philadelphia, (*Amer. Journ. of the Med. Sciences*, p. 37, Philad. 1842;) and, by Drs. McPheters and Perry, resident physicians at the Philadelphia Hospital, (*Amer. Med. Intelligencer*, March 15, 1841, p. 369.) They show, that when taken in conjunction with other phenomena, the appearance of the kiestein is certainly a great aid in the diagnosis of pregnancy. Mr. Letheby found unquestionable evidence of it in 48 out of 50 cases between the second and ninth months of utero-gestation, and was unable to account for its absence in the two exceptions. The result of Dr. Kane's observations, which the writer had an opportunity of examining from time to time, and for the accuracy of which he can vouch, is stated by Dr. Kane as follows: *First.* kiestein is not peculiar to pregnancy, but may occur whenever the lacteal elements are secreted without a free discharge from the mammæ. *Secondly.* Although it is sometimes obscurely developed, and occasionally simulated by other pellicles, it is generally distinguishable from all others. *Thirdly.* Where pregnancy is possible, the exhibition of a clearly-defined kiesteinic pellicle is one of the least equivocal proofs of that condition; and *fourthly*, when the pellicle is not found in the more advanced stages of supposed pregnancy, the probabilities, if the female be otherwise healthy, are as 20 to 1 (81 to 4) that the prognosis is incorrect. The writer has distinctly noticed, in some of the cases, the cheesy odour of kiesteinic urine described by Dr. Bird. (See, on all this subject, Hüter, Art. *Schwangerschaft. Geburtshülfich*, in *Encyclopäd. Wörterb. der Medicinisch. Wissensch.* xxx. 577, Berlin, 1843, and Prof. T. R. Beck, in *Amer. Journ. of the Med. Sciences*, Jan. 1843, p. 112.)]

Usual Conditions of the Female.—Before entering on the last division of our subject, which will treat of the post-mortem examination, it appears necessary to advert to certain conditions in which a female may become pregnant, and her case be thereby rendered more obscure; as when, for instance, conception takes place,—1. in early youth or advanced age; 2. during the existence of disease, especially of a kind calculated to prevent conception, or to render its occurrence very improbable; 3. without the woman being conscious of having incurred the risk; 4. under circumstances not likely to be followed by such a result, as where copulation was only partially accomplished, &c., &c.

1. *The age of the individual.*—This may be such as, judging from what we observe in the ordinary course of nature, would appear either to

preclude the idea of impregnation, or at least to render its occurrence extremely improbable. The limits of the generative faculty in women are generally those of the function of menstruation, but in some rare instances women have been known to conceive before the catamenia had begun to appear, (see cases referred to under the second section of this article, [also, the writer's *Human Physiology*, ii. 350, Philad. 1844,] and after their cessation.

Conception before the age of fourteen is very rare, but it appears that instances of it have occurred. Bruce mentions that in Abyssinia he has frequently seen mothers of eleven years of age; and Dunlop witnessed the same in Bengal. (Beck's Jurisprudence, page 82, note.) La Motte delivered a girl who had not completed her thirteenth year. (Traité d'Accouch. obs. xxiii. p. 52.) Instances of conception at nine and ten years of age are recorded by Jubert Schwrigius (see Smith, p. 493, note, and Ballard, note on Metzger, p. 485) and others, but they scarcely appear deserving of credit; yet we find Dr. Good expressing his assent to such relations, and quoting Haller (Vide Blumenbach, Bibl. i. p. 558) and Professor Schmidt (Act. Helvet. iv. 162. Eph. Nat. Cur. dec. iii. ann. ii. obs. 172) in support of them. (Study of Medicine, vol. v. p. 157.) The earliest instance of pregnancy known to the writer was that of a young lady who brought forth twins before she had completed her fifteenth year. Sir E. Home knew two instances, in one of which a girl of thirteen, and in the other a girl of twelve, gave birth to children. (Philosophical Transactions, 1819, p. 61.)

So also pregnancy very seldom occurs after fifty, especially in women who have not previously borne children; but instances have from time to time occurred at unusually late periods in women who had formerly conceived. In the statement sent to parliament by Bartholomew Mosse when endeavouring to procure a grant for the Dublin Lying-in Hospital, he mentions that eighty-four of the women delivered under his care were between the ages of forty-one and fifty-four; four of these were in their fifty-first year, and one in her fifty-fourth. (Case of Bartholomew Mosse presented to the House of Commons, 1755). The succession to an estate was disputed in France because the mother was fifty-eight years old when the child was born: the decision was in favour of the fact. (Mém. de l'Académie de Chirurgie, tom. vii. p. 27). Colomb adduces a similar case, and Knebel (V. pol. ger. ek. i. p. 161) two, one of fifty-two years, and the other of fifty-four. "In May, 1816, Mrs. Ashley, wife of John Ashley, grazier, of Firsby near Spilsby, at the age of fifty-four was delivered of two female children, which with the mother were likely to do well." (Edinburgh Annual Register, vol. ix. part 2, p. 508.)

While writing these observations, an eminent accoucheur of Dublin (Dr. Labatt) informed us that he some time since attended a lady who was married when forty years of age, and that after remaining barren for ten years, she conceived for the first time when she was past fifty, went to her full time, and after a difficult labour bore a living child.

Capuron (Médecine Légale, &c., p. 92–3, and 98) quotes several cases of child-bearing in advanced age, among which are the following:— Pliny records the case of Cornelia, of the family of the Scipios, who at the age of sixty bore a son who was named Volusius Saturninus. Marra, a physician of Venice, mentions that he treated a woman for dropsy who was really pregnant, and he was deceived by her age, which was sixty. La Motte tells of a woman who refused to marry until she was fifty-one, in order that she might escape child-bearing; but she was disappointed, and bore a child. Valescus de Tarenta mentions a woman who continued to menstruate beyond sixty, at which age she bore her last child: Capuron adds that it was generally believed in Paris that a woman in the Rue Harpe bore a daughter at the age of sixty-three, and nursed it.

The occurrence of such cases, however rare, should at least have the effect of making us extremely cautious in pronouncing against pregnancy, merely because the individual may have exceeded by ten or fifteen years the period of life after which the generative faculty ordinarily ceases to manifest itself; or because the woman may have lived for many years a married life without conceiving, and then show symptoms of pregnancy. A highly interesting case of this kind is, at the moment of writing this, under our care. A lady now in her forty-third year, who was married to her present husband twenty years ago, remained without any promise of offspring until within the last few months; but having missed her menstruation in September last, and finding her size increasing, the writer was requested to see her in January, when she exhibited evident symptoms of pregnancy: she has since under the writer's care been delivered of a healthy boy after a natural labour of about *four hours*. Dr. Gooch relates a case almost exactly similar, which occurred in "a woman of forty-two years of age, and who had been married twenty-two years without ever being pregnant," when she at length conceived, and brought forth a child at the full time.*

2. *Complication with Disease.*—Pregnancy not unfrequently takes place in diseased states of the system, which would, *à priori*, render its occurrence very improbable, and which, when it does occur under such circumstances, give rise to an unusual difficulty in recognising its existence. From this circumstance have from time to time arisen some very lamentable mistakes in practice. Thus women who have been long labouring under a general infirmity of health and with very irregular menstruation, or even a total suppression of that discharge, may conceive, and under such circumstances the phenomena of pregnancy are likely to be much obscured, or even their existence at all rendered very doubtful. Such a case is mentioned by Professor James of Philadelphia, in which a woman conceived after having had the menses suppressed for nearly two years before. (Hosack's Med. and Phil. Register, vol. iv. p. 422.) Diseases which increase the size of the abdomen, as they on the one hand often induce the supposi-

* Diseases of Women, p. 220. The following is inserted in the Scots Magazine for the year 1769, vol. xxxi. p. 279, under the head of "Births:" "May. At Doncarney in Ireland, in the 85th year of her age, the wife of one Rogers, a labouring man, of a boy!!!"

tion of pregnancy when it does not exist, so on the other hand they sometimes render its detection a matter of great embarrassment. Several instances have occurred in which women labouring under dropsy, even when the complaint was the result of serious organic disease, and had existed for a long time, have proved with child, and from the combination of circumstances thus produced great doubt and difficulty are likely to arise, especially when the woman is not herself aware of her condition, as happened to the wife of the king's council mentioned by Mauriceau, who was treated during seven months of her pregnancy for dropsy, and then brought forth a child. (Tom. i. p. 73.) In some instances very grievous errors have been committed. Mauriceau relates two cases of this kind, in one of which the woman had been nine years affected with dropsy in an extreme degree, but had during that time given birth to four children. (Maladies des Femmes grosses, tom. ii. obs. 70 and 249.) M. Chamsern had a patient who was tapped one hundred and sixty-nine times, and during the course of the disease she bore and suckled two children, though during each pregnancy it was found necessary to tap her three times.* Foderé mentions two women who, being pregnant, were tapped under the idea that they had dropsy; (Médecine Légale, tom. i. p. 463–4.) the uterus fortunately was not wounded; but in another case of distended bladder accompanying pregnancy and mistaken for dropsy, the practitioner tapped the patient; "death was the consequence, and on examination it appeared that the trochar had passed through both sides of the bladder, through the uterus, and even into the head of the child." (Lowder's MS. Lectures, quoted by Gooch, on Diseases of Females, p. 240 and note.) Capuron mentions that Marsa, a physician of Venice, treated a woman for dropsy, who was pregnant, being deceived by her age, which was sixty.† In a case which occurred to the writer, pregnancy remained a matter of the utmost doubt until the seventh month; the woman died two days after delivery, and the liver was found tuberculated, hard as cartilage, and diminished to about one-third of its natural size. "The bare possibility of such cases," says Gooch, "is a strong reason for never tapping a married woman without having the uterus previously examined by a person skilful in such examinations." Beck makes the following observations on this subject: "The most difficult case of concealed pregnancy that probably can occur, is when it is accompanied with ascites. The motion of the fœtus cannot be perceived; and it is added by Foderé, that the uterus does not take on its ordinary development. Yet many cases are on record where females with this disease on them have been delivered of healthy children. In suspected cases the practitioner should weigh the symptoms and ascertain whether they are all referable to the disease. His medicines should be mild, and patience exercised as to the event." (Elem. Jurisp. p. 81.)

Enlargement of the ovary is another disease which may either simulate pregnancy or coexist with it,‡ and the abdominal enlargement increasing may be mistaken for the progress of the disease; when both ovaries are affected, pregnancy is of course much more improbable, yet it has occurred. Morgagni declares that even in disease of both ovaries, if there remain healthy a portion containing one vesicle, the woman may conceive.§ A case very lately occurred in this city, in which a lady with ovarian enlargement at both sides, and of considerable size, became pregnant, and her true condition was not recognized until pregnancy was very far advanced, when the application of the stethoscope detected the pulsations of the fœtal heart. Under such circumstances a proper examination of the uterus per vaginam ought to enable us to detect the nature of the case. On the other hand, the existence of such a disease has repeatedly given rise to the suspicion of pregnancy. In the celebrated case of the Demoiselle Famin, published at Berlin and Paris by Valentin, in 1768, a charge of pregnancy and child-murder was erroneously instituted in consequence of an extreme case of ovarian dropsy.

The writer had once an opportunity of examining a very remarkable case, which presented a combination that could hardly fail to be attended with infinite doubt. A woman was received into the Cork-street Fever Hospital in 1828, with considerable enlargement of the abdomen. Her history, as far as it could be learned, was, that eight years before she had been in labour, which, after continuing for two days, suddenly ceased, and the child, as she expressed herself, rose up into her stomach: no delivery followed. After remaining in bad health for about two years, she again experienced the symptoms of pregnancy, and gave birth to a child, which did not survive; but the former child still remained in the cavity of the belly, and during its continuance there she bore three children, the last of whom lived. Ultimately a fistulous opening formed near the umbilicus, which was enlarged, and the original child removed; it was in a state of wonderful preservation, measured twenty-two inches in length, and had attached to it about two feet of the umbilical cord.‖ Some of the most formidable diseases of the uterus have been found not incompatible with conception, and even the completion of the full term of gestation. Thus, instances of the concurrence of polypus, uteri, and pregnancy have been several times witnessed;¶ and in some cases the placenta has been found attached to the polypus.** The writer has a preparation in which an early

* Quoted by Foderé from the Bullet. des Sciences Med. d'Evreux, 1810, No. 18, p. 135. See also Mr. Langstaff's case, Med. Chir. Trans. vol. xii. p. 372, and another by Scarpa in the Quarterly Journ. of For. Med. vol. i. p. 149.

† Avenzoar has left a confession that he was deceived about his own wife, whom he treated as dropsical, though she had passed her fourth month of pregnancy. See Paris and Fonblanque, vol. i. p. 288.

‡ See Gooch, p. 239. Merriman's Synopsis, pp. 58 and 228.

§ See case by Mr. Hewlett, Med. Chir. Trans. vol. xvii. p. 226.

‖ A notice of this case was published by Dr. O'Reardon in the Medico-Chirurgical Review for October, 1828.

¶ See Gardien, tom. i. p. 443,—Gooch, Diseases of Females, p. 290,—Dr. Beatty in Trans. Assoc. Coll. Phys. Ireland, vol. iv. p. 1. London Med. and Phys. Journal, vol. xxvi.

** See Glasgow Medical Journal, vol. i. p. 422. Bach. Mayor de Polypis, quoted by Cooper in the Surgical Dictionary, article *Polypus*.

ovum is thus connected. Levret,* Bach, Joerg, and Dr. Macfarlane have recorded cases in which the fœtus reached its full time under such circumstances. Even cancer and fungoid diseases of the uterus have been proved not to prevent the occurrence of pregnancy,† and a scirrhous cervix has been found an obstacle in the time of labour,‡ Gardien expressly states that numerous facts within his knowledge have proved to him that women may carry their children to the full time although labouring under cancer in the ulcerated state.§

Women have been impregnated although afflicted with complete external prolapse of the uterus. M. Guillemot has written a very interesting paper on this subject, in which he has collected from various sources nine cases of the kind, the first two of which are particularly remarkable as examples of gestation accomplished where the prolapse was complete. (Quoted from, 1. Archives de la Soc. d'Emulation. 2. Journal de Méd. et de Chirurgie for 1775.) In the third case impregnation occurred while the uterus was completely external.‖ Another of the cases happened in the practice of the great Harvey, who gives us the following account of the matter: "And now at this time it was large and dangling between her leggs. It grew at last bigger than a man's head, being then a hard tumour, and hanging downe to her knees did much pain her, so that she could not goe but upon all foure. I did suspect it to be a cancer of the wombe, and therefore did bethink my selfe of a ligature and cutting it off: but the following night an infant perfectly shaped, of a span long, was cast out of that tumour, but it was dead." (Anatomical Exercitations concerning the Generation of living Creaturcs, p. 494.)

We have thought it advisable thus to enter fully into the statement of such unusual conditions, lest a proposition on our part against the possibility of such occurrences should act unfavourably, either by closing our eyes against the evidence before us in extraordinary cases, or making us less careful in their examination from a pre-conviction that pregnancy could not under such circumstances exist.

3. *Conception without the knowledge of the woman.*—That a married woman, or any female who has indulged in sexual intercourse, may become pregnant without being aware of her condition, is a fact too notorious to require further obscrvation than the mere mention of it. the question which we propose to consider here is,—can a woman become pregnant in consequence of intercourse, of the occurrence of which she was not conscious, and so find herself with child without being aware of having incurred the risk? Improbable or even absurd as such a supposition may at first sight appear, the possibility of such an accident is established by too many facts testified by high authority, to permit incredulity on the subject. The belief that consent and pleasurable sensation on the part of the woman are conditions necessary to conception is now universally known to be without foundation in nature, and of course no longer influences legal decisions: formerly, however, it was otherwise, so that in case of rape, if pregnancy followed, it was presumed to prove consent, and it was so laid down by Dalton; (Dalton, c. 160. See also, 2 Just. 190,) but Lord Hale says that this opinion of Dalton seems to be no law. (1. H. H. 131. See also, MSS. Sum 334.) "That so absurd a notion as that conception evidenced consent should in modern times have obtained amongst any whose education and intellcct were superior to those of an old nurse, is indeed surprising; at this day, however, facts and theory concur to prove that the assentation of nature in this respect is no ways connected with volition of mind." (Burn's Justice, tit. Rape.) "It is a fact," says Capuron, "which experience has more than once confirmed, that a woman may become with child while in a state of hysteria, under the influence of narcotics, during asphyxia, drunkenness, or *deep sleep*, and consequently without being conscious of it, or sharing the enjoyment of the man who dishonours her;" and in proof he mentions having attended a young woman who was got with child while totally unconscious, being buried in a deep sleep produced by punch given her by her paramour. (See Méd. Lég. relat. aux Accouchemens, pp. 57, 84.) She became aware of her condition for the first time when she felt the sensation of motion in the fourth month. Foderé expresses a similar opinion, and quotes several instances in which the occurrence took place, one of which is particularly remarkable. (Médecine Légale, tom. i. pp. 497 et seq.) MM. Marc (Dict. de Méd. tom. xxi. p. 358–9,) and Raige Delorme (Dict. de Méd. tom. x. p. 465–6. See, also, Smith, Forens. Med. p. 401,) speak of such a fact as established by experience. Dr. Gooch says, "it is not necessary that the woman should be sensible at the time of impregnation," to which observation the following case is subjoined: "A maid at an inn, who was always thought to be virtuous, and bore a good character, began to enlarge in a way which excited suspicions of pregnancy; she solemnly declared that she never had connection with any man. At length she was delivered, and was afterwards brought before a magistrate to swear to the father; but she repeated her former declaration. Not long afterwards a postboy related the following circumstances: that one night he came late to this inn, put his horses into the stable, and went into the house; he found all gone to bed except this girl, who was lying asleep on the hearth-rug, and without waking her he contrived to gratify his desires." "This shows," he adds

* Mém.de l'Acad. Chir. vol. iii. p. 543.

† See case by Dr. Beatty, Trans. Assoc. Coll. Phys. vol. i. New Series, p. 116–7.

‡ See Burns's Principles of Midwifery, 7th edition, p. 96, note, and p. 401.—Clarke on Diseases of Females, part i. p. 213.—Denman's Introduction, &c. ed. 5. p. 363. A most remarkable case of this kind has been recorded by M. Neyzonis, in which the woman died undelivered; the parietes of the uterus were found carcinomatous, and three inches thick near the fundus. Dict. des Sciences Méd. tom. iv. p 237.

§ Traité d'Accouch. vol. i. p. 430.—See Raige Delorme, Dict. de Méd. tom. x. p. 464.

‖ From Chopart, Malad. des Voies Urinaires, vol. i. p. 389, note. The circumstances of this case were very remarkable. The woman was married at twenty years of age, and during twenty-one years "son mari fit des tentatives infructueuses pour la rendre mère; enfin au bout de ce tems-là, il parvint à dilater l'orifice de la matrice qui étoit hors des grandes lèvres, et consomma l'œuvre de la génération." The account of the labour and delivery, &c. are full of interest.

"that impregnation may take place without the knowledge of the female." (Compendium of Midwifery, p. 81–2.)

In reference to this question Beck remarks, "In females habituated to sexual connection, or where sleep is unnaturally produced, there is no doubt of its occurring; whereas in the opposite cases the probability is greatly lessened;" (Elem. Med. Jurisp. p. 92); and in a note on this passage he quotes the following case: "A pregnant female in her last moments solemnly declared that to her knowledge she never had connection, but that a person in the family some time previous had given her some wine to drink, after which she fell into a profound sleep. She was not, however, conscious of any thing having occurred during that state, but mentioned the circumstance as probably explaining her situation." (Mierius in Brendel, p. 99.) A case very much resembling that related by Dr. Gooch has just been mentioned to the writer by Mr. Cusack, which occurred under his own observation. A servant woman at an hotel in Neaugh proved pregnant, and solemnly declared that she was not conscious of having had intercourse with any man. Suspicion, however, fell upon an hostler in the establishment, who subsequently acknowledged that he believed he was the father of the child; that having found the woman in a deep sleep from fatigue, caused by long-continued exertion and being kept out of bed two or three nights in succession, he had connection with her, and, as he believed, totally without her knowledge, as she did not evince the slightest consciousness of the act at the time, or recollection of its occurrence afterwards; the parties were married with mutual consent.

We once attended a patient who even in her dying hour protested in the most solemn manner that she was not conscious of sexual intercourse; and when we recollect that delivery has occurred during sleep, we cannot doubt but that coition, which is so much less likely to disturb, may be consummated during sleep with a female accustomed to sexual indulgence without her being afterwards aware of it. That such an event must be of very rare occurrence is certain, but we cannot deny its possibility, and therefore we are furnished with an additional reason for refusing implicit assent to the statements of females, who, as they will in ordinary cases of illegitimate pregnancy deny the possibility of their condition with the most unparalleled effrontery and the most solemn and imposing protestations, so should we, on the other hand, recollect that impregnation may possibly have been effected without their knowledge; so that, however highly we may esteem their general credibility in other matters, in this they may either try to deceive us or be themselves deceived; we must therefore form our opinion not by what we hear, but by what we can see and feel.

[Yet the cases adduced of conception without consciousness of intercourse on the part of the female are few, and by no means overwhelming. If, indeed, it be requisite, that through venereal excitement, the Fallopian tubes must embrace the ovary, in order that the sperm may reach the ovary and impregnate an ovum, it is difficult to comprehend how conception can take place without some *feeling* on the part of the female.]

The following case is quoted by Bruhier, Foderé, (Médecine Légale, tom. i. p. 500–1,) and others, (Louis, Lettre sur la certitude des Signes de la Mort,) from the Causes Célèbres, to show the possibility of conception during a state of complete asphyxia or apparent death. "A young friar being on a journey, arrived at a house where they were about to bury a young girl, whom they believed to be dead. He proposed to pass the night in the chamber with the coffin and watch the body. In the course of the night, while examining the body, his passions were so excited by the beauty still remaining, that he determined on satisfying them even under such circumstances. He departed early next morning, and in the course of the day the apparently dead revived, proved to be pregnant, and at the end of nine months brought forth a child, to the great amazement of her friends as well as her own. The friar returned to the place about this time, confessed himself the father of the child, and married the mother, having procured absolution from his vows, which he had taken against his will."

4. *Presence or absence of the hymen.*—It seems almost unnecessary to remark that the presence of the hymen, however perfect its condition, cannot be assumed or depended on as a conclusive proof against the previous occurrence of impregnation, for although it certainly ought to be considered as strong presumptive evidence in favour of virginity, so many cases have been witnessed and put on record by authors worthy of credit, in which that membrane has been found coexisting, not alone with pregnancy, but even with labour, that the fact no longer remains a matter of doubt, Meckel (Anatomie Descriptive, &c. vol. iii. p. 735,) remarks that "the hymen cannot be considered a certain physical sign of virginity, because, on the one hand, it has been often found entire not only in women who had frequently indulged in sexual intercourse,* but even in some who had brought forth fœtuses advanced even so far as the seventh month."† The writer was once consulted by a young person whom he found to be pregnant, but whose hymen was as perfect as it had probably ever been; but the opening through it was such as to admit the finger to pass without difficulty, and the girl acknowledged that she had on more than one or two occasions enjoyed the embraces of a very young gentleman, on whose youth it appeared she had relied for immunity from the usual consequences.‡ The existence of the hymen at the time of labour has been detailed by Ambrose Paré, Willis, Ruysch, Nœgele, Baudelocque, (Art des Accouchement, vol. i. ch. 3,) Mauriceau,§ and many others: the cases related by the last two are particularly remarkable. Dr.

* Osiander. Abhandlung über die Scheidenklappe, p 24. "Miles causes étrangères au coit peuvent le détruire, et que la copulation n'en détermine pas toujours la rupture." *Velpeau*, tom. i. p. 63. See also Metzger, by Ballard, pp. 251-2.

† Tolberg de Varietate Hymenum, p. 14. Meckle says he has the part in his museum.

‡ See Wm. Hunter's case in *Observations on the areola* in the present article.

§ Maladies des Femmes Grosses, tom. ii. obs. 489, p. 405, and obs. 583.

Davis* also refers to more than one case of this kind. Velpeau (Traité d'Accouch. tom. i. pp. 63–4,) mentions having met with the hymen entire in the body of a woman of forty, "who had long cohabited with her husband, but without having children." The writer once witnessed a similar case in an old lady of 80, who had been married and lived thirty years with her husband without having children: when visited by the writer, she had been some years a widow, and examination of the parts became necessary in consequence of an affection of the urethra; the hymen would not permit the passage of the point of the little finger without difficulty.

On the other hand we believe it is a matter of universal agreement, that there are many causes besides sexual intercourse capable of destroying this membrane, which there is also good reason for believing may in some cases have been originally defective from imperfect conformation of the part. (See Meckel, loc. cit.) In another part of this article the imperforate hymen has been noticed, and its effect in inducing suspicion of pregnancy by preventing the discharge of the catamenia. And it is scarcely necessary to observe here, that in such a case the mere discovery of the obstacle would be proof positive against the condition suspected. Among the Jews a discharge of blood as the consequence of the laceration of the hymen in primis nuptiis, was considered so unequivocally the test of virginity, that it was made a subject of legislation, and the woman to whom this did not happen was liable to be stoned to death. (Deuteronomy, chap. xxii.) Gardien mentions that the Jewish custom prevails to a certain extent at the present day amongst the Bedouin Arabs; and Mahon, on the authority of Chappe, speaks of a similar custom as at present existing in Siberia and in certain parts of Russia. (Médecine Légale, tom. i. p. 123.) It has been remarked by Foderé, Mahon, and others, that the state of the hymen may vary much in the same individual at different times and under different circumstances; and the latter mentions a case where a man not finding it existing in his bride took great offence, but afterwards finding a totally different condition of the part, recognised his error and was satisfied. (Loc. cit. p. 121.) Marc has recorded a very remarkable case illustrative of this, and, as he says, "showing that, when the hymen is of the semilunar form, it may disappear for a time, and return again." (See the statement of Buffon, as quoted by Mahon, tom. i. p. 127–9.) "A young girl, not 13 years of age, formed an illicit intercourse with a man, in consequence of which she was severely affected with syphilis, for the cure of which she was brought to the hospital of La Pitié: on examination by Dr. Serres and others, there was found extreme dilatation of the vagina, injury of the external genitals, and total absence of the hymen: she was cured, and then they were greatly astonished to find all the physical marks of virginity existing, especially a well-marked semilunar hymen. MM. le Docteur Fournier, Pescay, and Marc were appointed by the Medical Society of Emulation to examine the fact." (Dict. de Méd. Art. *Violation*, by Marc. vol. xxi. pp. 353–4.)

As a suitable conclusion to this section we shall notice a very remarkable case recorded by Nysten, forcibly illustrating the necessity of attending to these unusual conditions, as not being incompatible with pregnancy, which in the case alluded to occurred in combination with several such. In this instance, 1. the pregnancy was ovarian; 2. the girl was only thirteen years old; 3. she had never menstruated; 4. the hymen was perfect; 5. the vagina so contracted that it would scarcely admit the tip of the finger; 6. the organs of generation and the breasts like those of childhood." (Journal de Médecine par MM. Corvisart et Leroux, brumaire, an 11. p. 144, et seq.)

Examination of the Uterus and its appendages after death. — It is unnecessary to repeat here what has been already particularly set forth with regard to the state of enlargement in which the uterus must be when containing the product of conception. In relation to our present subject, the first and most obvious fact to be noticed is, that when an examination is made after death, and the uterus found of its naturally diminutive size, it is proof positive against the present existence of pregnancy. If, on the other hand, we find the organ enlarged, and its condition apparently corresponding to the period of pregnancy supposed to exist, nothing but a careful examination of its contents, or other cause of enlargement, can determine the question at issue. We will here only observe that nothing less than the distinct and unequivocal detection of the ovum or some of its component structures ought to satisfy our minds, or justify us in giving an opinion in the affirmative. (See section on *Substances expelled from the uterus.*)

Another condition of the uterus which may present itself, is that in which it is found enlarged but empty, exhibiting, however, several of the changes which accompany gestation: these, however, upon examination will only afford evidence sufficient to convince us that the organ has recently been distended by something contained within it, and which had been attached to its internal surface by a vascular connection: the substance expelled may or may not have been the product of conception; and the most careful examination of the appearances remaining, or of the structural changes effected, will not enable us to pronounce safely on the precise nature of the cause which had produced them. Thus, for instance, in a case where hydatids have been expelled, we could not determine by examination of the uterus alone, whether the conditions there observable were the result of true pregnancy and the expulsion of a fœtus or ovum, or whether they might not have been produced by some other cause unconnected with conception: we may not, in fact, be able to tell without further investigation whether the woman have recently conceived or not, a question which it may be occasionally of paramount importance to be able to answer: we must therefore turn our attention in another direction, and seek for proof of impregnation in the appendages, particularly in that part of them which is more especially the seat of conception.

* Principles of Obstetric Medicine, p. 104. See also Gooch's Compendium of Midwifery, p. 81, and Paris and Fonblanque, vol. i. p. 203. Several similar cases are mentioned in Merriman's Synopsis of difficult parturition, see pp. 58 and 228, 4th ed. See also Smellie, Collect. xxxi. case 26, p. 62.

This leads us at once to investigate the value of that peculiar change in the ovary, by which, after the vivification of the germ, there is produced a new structure, to which has been applied the name of *corpus glandulosum*, or more generally, *corpus luteum*, — a production the presence of which is by some considered incontrovertible evidence of impregnation. Others, however, with equal confidence discredit the value of its presence, and assert that its existence may be owing to causes altogether accidental and independent of sexual intercourse, and that consequently it cannot be taken as certain evidence of conception. It becomes, therefore, a matter of vital moment to examine the truth of such assertions, and to determine, if we can, how far they coincide with or depart from absolute matter of fact, which alone can be the measure of their correctness, and consequently of their value. In order to do this, the first thing which appears to us essentially necessary is, that we should have a clear idea of what a true corpus luteum is, and of what is not a corpus luteum.

If this inquiry should appear to any one superfluous, it is only necessary to turn to the generality of books in which it is mentioned, and then compare the descriptions to be found there with the object as it exists in nature, and we must be convinced how faint is the resemblance between the portrait and the original. We are inclined to think that the naming of this substance has given rise to much of the error which exists and is propagated on the subject, the colour being assumed as the only characteristic necessary to constitute the corpus luteum. Whenever small spots, or even points, of a yellow hue are met with in the ovaries, they are supposed to be true corpora lutea. We recollect distinctly the first time our attention was drawn to the subject was at a demonstration of the structure of the ovaries, when two spots, each not larger than a grain of mustard-seed, and of a yellow colour, were exhibited as specimens of corpora lutea, and as proving that the woman had, during her life, borne two children.

A trial took place some years ago in Edinburgh, which, while it evinced the necessity for a correct knowledge of this subject, which might occasionally arise even under circumstances not apparently connected with its existence, proved but too plainly how little was known about it. A prosecution was instituted against four medical students for exhuming the body of a lady in Glasgow. The body was so disfigured that it could not be identified: the ovaries were, however, examined, and it was reported that there was in one of them a perfect corpus luteum, which would be sufficient to prove that the remains were not those of the lady in question, who was a virgin, and advanced in life. On the trial there was a complete contradiction between the medical witnesses, one-half of whom affirmed the appearance in the ovary to be a true corpus luteum, while the others maintained that it was not; so that no satisfactory inference could be drawn from the fact. The body was afterwards identified by a dentist producing a cast which he had taken of the gums.

If we examine the ovaries of a woman who has recently conceived, we observe that the one which has supplied the germ differs in several remarkable particulars from its fellow of the opposite side: it strikes the eye at once as being larger and more vascular; to the touch it feels fuller and softer: we perceive further, that this increase of size of the one is not so much the result of an increased development of the whole substance or body of the organ, as of the addition to it at one part, of a tumour projecting more or less from its natural outline, as we find in the eye, where the circumference of the cornea projects from the outline of the globe, the segment of a smaller circle being superimposed on that of a greater.

When we examine this protuberance, we find that the increased vascularity of the organ is nearly confined to its limits, and very frequently we perceive that the colour of this part is completely different from the rest of the substance, giving the notion of deep or dull yellow seen through a slightly reddish medium; and lastly, we observe on some part of the external covering of this prominent part a distinct cicatrix, or appearance as of a rent imperfectly united.*

We should observe here that these external changes by which we recognise the existence of the corpus luteum within, are to be seen most remarkably in some of the lower animals. In cows it is not unusual to see the corpus luteum projecting almost like a parasitic tumour from the side or cud of the ovary; the same may be said of the sheep, and of animals which naturally have the Graafian vesicles very prominent, as the hedgehog or common sow, in which they absolutely project from the surface: in this animal the ovaries after conception appear literally like bunches of round berries, from the great prominence of the numerous corpora lutea.

Having satisfied ourselves of the presence of the external characters, we proceed to examine the internal structure; in order to do which we should make a section of the ovary, carrying the knife through the centre of the prominent part so as to divide the ovary into two longitudinal sections, by which we expose the corpus luteum presenting the following characteristic appearances.

In *form* and *size* it is almost always an oval, with its longer axis varying from four to five eighths of an inch, and the shorter from three to four eighths; its thickness is generally less than its breadth.†

Its texture is obviously and strikingly glandular, resembling a section of the human kidney; (see De Graaf, p. 177); or, as some one has said, it is like a miniature of the particular sections of the brain called by anatomists *centrum ovale*. William Hunter describes it as "tender and friable, like glandular flesh." (Anatomy of the Gravid Uterus, p. 14.)

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* In the case examined by Sir E. Home and Mr. Clift, where the woman died eight days after impregnation was supposed to have taken place, "the right ovarium had a small torn orifice upon the most prominent part of its external surface. We slit it open in a longitudinal direction, in a line close to the edge of this orifice; the orifice was found to lead to a cavity filled up with coagulated blood, and surrounded by a yellowish organized substance." Philos. Trans. 1817, p. 254.

† "Pene hemisphericum, avellanæ mole." *Haller.* — "Longum quatuor lineas, latum tertias lineas, crassum duas lineas." *Rœderer.*

It is very vascular, small vessels being very frequently visible without any preparation; but if fine-coloured injections have been previously thrown into one of the branches of the spermatic arteries going to the ovary, the vessels of the corpus luteum will be filled with the colouring matter, and are to be seen very distinctly running from its circumference towards its centre.

Its colour is, as its name implies, a dull yellow, very similar to that of the buffy coat of the blood; exhibiting generally, when recently exposed, a slightly reddish tinge, "*ex flavo rubens*," Haller.

Its centre exhibits either a cavity or a radiated white cicatrix according to the period at which the examination is made: if within the first three or four months after conception, we shall frequently find the cavity still existing, and of such a size as to be capable of containing a grain of wheat;* this cavity is surrounded by a strong white cyst, and as gestation proceeds, the opposite parts of this cyst approximate and at length close together, by which the cavity is completely obliterated, and in its place there remains a white cicatrix, whose form is best expressed by calling it radiated. Of this latter appearance it ought to be observed here that it is visible as long as any distinct trace of the corpus luteum remains, and forms an essential character, distinguishing this body from every other that might be confounded with it.

After the period of gestation has been completed, or the contents of the uterus prematurely expelled, so that gestation ceases, the corpus luteum soon begins to exhibit a very decided alteration in all its characters, until at length it is no longer to be found in the ovary. The exact period of its total disappearance we are unable to state; but we have found it distinctly visible so late as at the end of five months after delivery at the full time, but not beyond this period; and the corpus luteum of a preceding conception is never to be found along with that of a more recent, when gestation has arrived at its full term; but in cases of miscarriage repeated at short intervals, it may. At the time of delivery the corpus luteum is neither so large nor so vascular as at the earlier periods of pregnancy, except the woman should happen at the time of her death to be labouring under inflammation of the uterine system, in which case the corpus luteum partakes of the turgescence of the other parts, and very remarkably of their increased vascularity.

In the ovary of a woman who died of inflammation of the womb a few days after delivery, and which is preserved in the writer's museum, the white central cicatrix is very distinct, and externally the ovary continues to exhibit the superficial cicatrix and the alteration of form produced by the projection of the part containing the corpus luteum. In another preparation, which shows the appearance of the corpus luteum in a woman who died of pneumonia exactly five weeks after delivery at the full time, it is diminished in size to about one-half of its original dimensions, is closer in its texture, and its colour was becoming indistinct in numerous points, so that it appeared paler, but the radiated central cicatrix is quite distinct; its vascularity also was diminished, as fine injection could not be got to pass into it: the external surface of the ovary exhibits the greater size and prominence of one part, and the fissure on it is still well marked; and it is particularly deserving of remark here that there is *only one cicatrix* observable on each ovary, although the woman from whom they were taken had borne six children.

In another specimen in our collection, taken from the body of a woman who died in the twelfth week after delivery, the external prominence was greatly diminished, but was still sufficiently obvious to indicate the exact situation of the corpus luteum, as was also the superficial cicatrix; the corpus luteum itself had lost much of its colour, and what remained became, on immersion into spirits, of a light grey shade; the texture of its substance was more condensed, and resembled that of a cut apple; and its dimensions, especially in breadth, are reduced to about one-third or rather less, but the central radiated cicatrix is still distinctly observable.

Lastly, in the case of a young woman who died *five months* after giving birth to her first child, the ovary retained very little of its increased size or altered form; the prominence was hardly to be recognised; but the external cicatrix was perfectly obvious. When opened, the corpus luteum exhibited its peculiar colour only in one very small spot, rather larger than a mustard-seed, within which is still observable the central radiated cicatrix; the yellow colour completely disappeared when immersed in perfectly pure rectified spirit diluted with water.† Beyond this period we have never detected the existence of the corpus luteum: the vulgar notion, however, is that it is a permanent structure, and that consequently we have only to examine the ovaries after death to enable us to tell not only whether a woman has borne children, but the exact number of her offspring, from the number of corpora lutea existing in the ovary. This is quite an error, and probably arose from a misconception of the meaning of such an expression as that of Haller, when he says—"Numerum credo eundem esse, qui est fœtuum," (Elem. Physiologiæ, vol. viii. p. 36); or, as in another place, "Numerus corporum luteorum est in ratione fœtuum." (Op. Min. vol. ii. p. 457.) By this expression, however, he only meant that their number was the same as that of the fœtuses lodged in utero in one gestation, which indeed we find expressly stated by De Graaf, whose words are—"Deteguntur, unus aut plures, prout animal ex illo congressu unum aut plures fœtus in lucem edet." (De Organis Mulierum Generat. &c. p. 178.) Hence, when there is only one fœtus, there is only one corpus luteum. In cases of twins or three children, there will be a corresponding number of these bodies in the ovary or ovaries, for they may be all formed in one ovary only, or some in each. This suggests a circumstance of very great importance connected with the number of these bodies which may be found; which is, that occasionally a corpus luteum may be discovered with-

* "Cavea dimidiam lineam lata, non profunda," *Haller*. We once met with this central cavity in the ovary of a cow recently impregnated, large enough to receive the end of the little finger.

† This does not happen when the corpus luteum, taken during gestation, or just at the time of delivery, is placed in contact with the same fluid.

out a fœtus, or a greater number of them than there are fœtuses produced at the time. Thus, in one instance we found two corpora lutea in the ovary of a woman who killed herself by medicine taken to produce abortion. She was reported to have expelled but one ovum. Haller notices this occasional occurrence, and explains it thus; "Si unquam absque fœtu corpus luteum in ovaria repertum est, quod est rarissimum, credibile est eum fœtum abortu perditum aut alio modo destructum disparuisse." (Elem. Physiologiæ, vol. viii. p. 36.) We have had several opportunities of verifying this observation, and, amongst other instances, we once found ten corpora lutea in the ovaries of a sow, but only nine fœtuses in the uterus; but at length, after a very diligent search, we discovered in one of the cornea the remains of another fœtus which had been blighted and was in a state of partial decomposition. Haighton also observed this occurrence, but adds that "the uterus in these cases has borne the marks of an early and recent abortion," (Philosophical Transactions for 1797, p. 166); and Cruikshank, as mentioned in another place, speaks of the corpus luteum as a certain mark of conception, "whether the embryo is visible or not." (Philosophical Transactions. 1797, p. 200.) We may remark that from such facts follows of necessity this circumscription of the conclusion to be drawn from what we may observe in the ovaries,—viz. that the presence of a corpus luteum does not prove that a woman has *borne a child*, although it would be a decided proof that she had been impregnated and had conceived; because it is quite obvious that the ovum, after its vivification, may be, from a great variety of causes, blighted and destroyed long before the fœtus has acquired any distinct form. But the converse will not hold good. We believe no one ever found a fœtus in utero without a corpus luteum in the ovary, and that the truth of Haller's corollary, "nullus unquam conceptus est absque corpore luteo," (Opera Minora, vol. ii. p. 458,) remains undisputed.

Considering the results constantly presented to us by examination, we feel utterly at a loss to imagine what could have induced the following assertion of Sir E. Home: "The remains of the corpus luteum at nine months *after impregnation of the ovum*, are so indistinct as hardly to be recognised; but in the opposite ovarium there is commonly a corpus luteum far advanced, forming another ovum; and it will be found that all the preparations of corpora lutea taken from the ovaria of women who die in childbed, actually belong to this new ovum not yet completely formed." (Philosophical Transactions, 1819, p. 63.) Now, our experience convinces us of the contrary of every statement here made, and we think that one question will be sufficient of itself to show their inaccuracy: premising that we deny altogether the statement that there is "commonly" found a second corpus luteum, we ask, if this corpus luteum always found in the ovaria of women who die in childbed belongs to the ovum not yet completely formed, how does it happen that we always find on its surface the cicatrix through which the ovum has already escaped?

A similar and equally erroneous idea obtains very generally with regard to the cicatrices on the surface of the ovaries, which have been already noticed as marking the situation of the corpus luteum. These are supposed by many to be permanent and ineffaceable, and of course certain indications of the number of children borne by the woman during her life, or of the number of times she had conceived. But such is not the case; the ovaries of women who have borne several children will sometimes be found exhibiting only one or two of these rents or marks on the surface, a very distinct instance of which has been already noticed; the woman in this case having given birth to six children, and yet the ovaries exhibited only one cicatrix on each. On the other hand the effects of inflammation, or the bursting of small abscesses in the ovary, may produce cicatrices which cannot be distinguished from those which are caused by the escape of the impregnated ovum. There is a passage in Beck's Jurisprudence which evinces extremely little practical acquaintance with the subject, implying one error, and distinctly asserting another. His words are, "Upon examining the ovaria, if it be done a short time after the ovum has escaped from them, a corpus luteum is *generally* found, which vanishes soon after, but *leaves a scar for life*." (Medical Jurisprudence, p. 140.) Dr. Smith appears to confound the cicatrix with the corpus luteum itself, in the following passage: "In the place from which one of these bodies (ova) had been conveyed, a cicatrix was formed which received the name of corpus luteum." (Principles of Forensic Medicine, p. 489. ed. 1821.)

Having thus far described the characters of the true corpus luteum as accurately as repeated observations and dissections of a great number of women, and a much larger number of brute animals, have enabled us, we wish to declare, first, that we never in any one instance saw the corpus luteum, having the characters we have described as belonging to it, except in females who had previously been impregnated and had conceived; and our firm conviction is, that such a corpus luteum was never found in a virgin animal.

As, however, different opinions have been entertained on this subject, it becomes necessary to examine them and ascertain their value. The views entertained by those who deny the necessary connection between the formation of the corpus luteum and sexual intercourse followed by conception, are principally two. According to the one, the corpus luteum is a provision for conception, by which the ovum lodged within it is prepared and fitted for impregnation. According to the other view, the corpus luteum is properly the effect of impregnation, but may also be produced by other adventitious circumstances causing high excitement of the generative apparatus independently of sexual intercourse. The first of these opinions is generally supposed to have originated with the late Sir E. Home, but it is only justice to say that he merely revived a theory which had been exploded and lain dormant for a long series of years, as appears very clearly from a passage in Wrisberg. This writer, after stating that multiplied observations both in the human race and in quadrupeds proved that the corpus luteum was not to be found in the ovaries "ante congressum fœcundum et inde pendentem conceptionem,"

adds, "ruit itaque ingeniosum potius quam naturæ congruum, de usu et functione corporis lutei, latum judicium conceptionis matcriem ex parte sexus sequioris comprehendere et secernere." (Vide paper by Wrisberg, in Trans. Soc. Reg. Gœttingæ for 1781.) The opinion here alluded to was that of Malpighi, Santorini, Valisneri, and Bertrandi; and it is remarkable that Sir E. Home should have promulgated it anew without even noticing its former existence, and that he should have done so on the data furnished to him by a single case,* in which he examined the body of a young woman who died a few days after conception, when he found an ovum in the uterus, and a corpus luteum in one of the ovaries. From this he concludes at once that this was the commencing provision for a future conception, not the result of the former; but the reasons are not stated.

It has been already shown that a similar notion was entertained many years ago, and its accuracy disproved by observation; but it is not altogether satisfactory, nor consistent with the spirit of philosophic inquiry, to reject an opinion merely because it has been already exploded, however high may have been the authority for its rejection. We must, therefore, examine this doctrine upon its own merits, before we can refuse it our assent. In the first place, then, if such a statement were correct, corpora lutæ ought to be found in the ovaries of almost all women examined just before or during the period of life in which they are apt for conception. No one has ever asserted that this is so; and in point of fact we know it is not the case. In the second place, if such were the relation of the corpus luteum to conception, it ought to be found in a state of greater development, as the distance of time from the former conception increases: now we have demonstrative proof that exactly the contrary happens. In the third place we find that their number corresponds to the number of fœtuses which have been produced, as already explained. Such objections might easily be multiplied, but those already stated appear more than sufficient for our purpose. The other assertion, that corpora lutea may be produced independently of sexual intercourse or conception, during periods of lasciviousness, or from the stimulus of strong passions, or unnatural enjoyments, requires a very careful examination, inasmuch as, if it be really borne out by facts, the presence of the corpus luteum in the ovary would cease to be of any value whatever as a proof of impregnation; and believing, as we think we have full grounds for doing from a very long-continued examination of the subject, that the real corpus luteum is the result of conception, and of nothing but conception, we think we shall be able to show that some of the assertors of this doctrine which we impeach, have in some instances merely repeated the statements of others without examination; while others have misrepresented the opinions which they quote in their support; and others, again, have mistaken for true corpora lutea accidental formations in the ovaries, having no one character, except the colour, of the bodies which really deserve the name.

Most of the writers who advocate the production of corpora lutea without impregnation, premise as a powerful support in their favour the opinion of Blumenbach, which is thus spoken of:—"In the year 1788 Blumenbach *showed* that corpora lutea may exist in the ovaries of virgins." (See a paper by Mr. Stanley, in the Trans. Coll. Phys. Lond. vol. vi. p. 421–2.) Now, before proceeding to review any of the opinions or assertions built on the authority of this great physiologist, we must first examine what he has really said on this subject. His observations are to be found in a *Specimen Physiologiæ Comparatæ*, (Trans. Soc. Reg. Gœttingæ, vol. ix.) published in 1788, and in our opinion are very far from warranting the conclusion so generally taken for granted to result from them; first, because his own definition of the corpus luteum renders it extremely doubtful whether his observations apply to the body really deserving that name, or merely to the cicatrix on the ovary connected with it. His words are: "Notum est post fœcundum coitum in mulicre aliisque mammalibus femineis, in alterutro ovario *fissuram* reperiri cruentam, ex ruptû sub œstrum venereum unâ alterâve earum vesicularum quas Graafius pro veris ovulis venditaverat; idemquevulnusculum temporis progressu in *cicatricem abire cortice eleganter vasculoso cinctam*, atque Malpighii inde temporibus lutei corporis nomine insignitam." (Op. cit. pp. 109–10.) And, secondly, even if we are satisfied that he there speaks of the true corpus luteum, which we very much doubt, it is very remarkable that in no one part of his paper does he speak as from personal observation or examination of the subject by himself, but confines himself to physiological reasonings grounded on the facts observed by others, ("Corpora lutea in innuptis observarunt *auctores*." Op. cit. p. 113.) from the consideration of which he declares his *belief* ("Et ita corpora lutea in virgineo corpore oriri *confido*,") in one place, and his *suspicion* ("Non absimilem originem *suspicor*," Op. cit. p. 113,) in another, that the fact may be so, but he nowhere asserts that he saw an instance of it; and he adds that all the cases his reading furnished him with happened in Italian girls, whose climate he appears to suspect might have something to do with the matter. The passage in which this is expressed appears to us, even from its singularity, worth quotation here; it is as follows:—"Num climati quoque aliquod tribuendum, decidere non audio, annotans tantummodo quotquot mihi hactenus *apud auctores* occurrerunt ejusmodi haud inficiendi casus eos non nisi in Italicis virginibus observatos fuisse." (Loco citato.) Meckel, also, is by some asserted to have maintained this doctrine; but it appears to us that so far as his observations go, they afford it very little if any support at all. He commences with these words:—"The internal organs of gencration are modified not by the act of intercourse merely, but by *conception alone*. There is developed in the ovary a peculiar body called corpus luteum," (Anatomie Descriptive, &c. p. 735,) which he then describes as resulting from a change produced in one or more of the vesicles of De Graaf; and adds, "the influence of the male semen is the ordinary and regular cause of this change, which, however, it

*This he himself declares; vide Philos. Trans. 1817, p. 255.

appears, may be effected under the influence of other stimuli, *perhaps* by the imagination or unnatural enjoyments." Now it is, we think, quite plain, from the language of the above passage, that he is alluding to the opinions of others, and not stating a fact of which he had assured himself; and accordingly he immediately subjoins, "in truth, many of these rare cases, in which corpora lutea have been found in unmarried women, and in girls having the physical marks of virginity, allow the belief that the formation of these bodies *had been preceded by sexual intercourse and fecundation*." He afterwards makes an observation which, if properly understood and appreciated, would have prevented many of the absurdities which have been promulgated on this subject. "They speak," says he, "of corpora lutea which have been found in new-born or very young animals; but the obvious answer to this is, that *every yellow substance* met with in the ovary *is not a corpus luteum*." (Anatomie Descriptive, &c. p. 736.) What but the most complete mistake on this point could have induced an annotator on Beck's Medical Jurisprudence to hazard the following observation:—"A recent case has in my opinion completely overthrown the theory, that even strong passions are necessary to the formation of the corpora lutea: the subject was *not above five years old*, and the hymen of course entire; she died of tubercular disease in the lungs, yet in her ovaries were *numerous corpora lutea* as distinct as I ever saw them in the adult impregnated female." (Beck, p. 103. Note, signed *Dunlop*.) The only comment necessary to make on this statement is, simply to remark that *one* real corpus luteum, as it is found "in the adult impregnated female," is fully as large, or even larger than the ovary of a child five years old, therefore it is *impossible* that there could in such a case be several of them.

Dr. Bostock, in his very able and instructive work on physiology, (Elementary System of Physiology, vol. iii. p. 36 et seq.) gives a summary of the opinions on this subject, but avoids hazarding more than a mere hypothesis himself. It is plain, however, that he inclines to the belief "that corpora lutea are not the necessary result of impregnation." (Note, loc. cit.) But we must observe that he overstates the opinion of Blumenbach when he asserts that he "decidedly maintained" such a doctrine, which we have already shown he did not; and he is equally inaccurate in quoting Cuvier as a supporter of this physiological heresy: it is only necessary to refer to the passage quoted, (Leçons d'Anat. Comp. t. v. p. 57,) to see that Cuvier is there not speaking of the corpus luteum at all, but of the cicatrices observed on the ovaries; *and throws out a question*, whether these may not sometimes be caused by the passage of germs, under the influence of unnatural stimuli. Dr. Seymour, in his very interesting work on the ovaria, (Illustrations of some of the Diseases of the Ovaria,) has given a well-arranged summary of the conflicting opinions and theories on this subject, to which he has added some very judicious and pertinent remarks; but upon the particular question before us, he expresses himself at least vaguely. He however appears to believe in the *possibility* of the production of corpora lutea without impregnation, but nowhere asserts that he saw an instance of the kind; on the contrary, the result of his own investigations, as stated by himself, is so strongly against such a belief, that we mean to quote it in his own words as a very strong fact in our favour. "It has occurred to me," he says, "to have examined the ovaria in the human being, and in animals at the period of puberty in very many instances; many had ova ready for impregnation, large, projecting, vascular, *yet no corpora lutea were visible*." (Op. cit. p. 32.) Such, also, has been the result of our examinations of a very large number of bodies both of women and of animals, and in no one instance did we ever find a true corpus luteum except as the product of conception; and reasoning merely on the subject, we would ask, if mere imagination or highly excited desires without intercourse are capable of causing such a change in the condition of the ovary, should we not expect to find corpora lutea almost invariably in women who have been living with their husbands, or otherwise enjoying constantly the natural and perfect excitement of the generative system without conception? Of the non-occurrence of which consequence we can speak in very decided terms, from numerous opportunities of making examinations under such circumstances.

We shall now proceed to state, as briefly as possible, the opinions of those whose careful and repeated examinations of the subject fairly entitle them to the highest degree of credit. De Graaf, who is justly celebrated as an accurate anatomist and physiologist, devoted much of his attention to the generative system of the female, and in his work on this subject published in 1672, (De mulierum organis generationi inservientibus tractatus novus, Lug. Bat. 1672,) we find him thus speaking:—"Quæ vero secundum naturam, aliquando tantum, in mulierum testibus inveniuntur; sunt globuli, qui glandularum conglomeratarum adinstar ex multis particulis à centro ad circumferentiam recto quasi ductu tendentibus conflantur, et propriâ membranâ obvolvuntur. Hos globulos non omni tempore in fœmellarum testiculis existere dicimus; quia *post coitum tantum* in illis deteguntur, unus aut plures, prout animal ex illo congressu unum aut plures fœtus in lucem edet." De Graaf applied to this formation the name of corpus glandulosum, which name it retained until Malpighi changed it to that of corpus luteum on account of its colour. The great Haller paid particular attention to this point, in the investigation of which he sacrificed many sheep, goats, and cows, besides great numbers of other animals; and by opening the bodies of several at gradually prolonged intervals of time from intercourse with the male, he traced the corpus luteum from its first commencement through all its successive stages of increase and decline. (Vide Elem. Physiologiæ, vol. viii. sect. xv.) He tells us, also, that he had opened the bodies of upwards of a hundred women, and met with the corpus luteum about ten times, but never except in those who were at the time pregnant, or had brought forth children. (Vide op. min. vol. iii. p. 185, 186.) "Quotquot feminæ nullam fecundationem ante mortem passæ sunt, tot etiam incisæ nulla corpora

lutea ostendunt." Now it is to be observed that Haller continued this investigation through many years, and was perfectly well aware of the theories of Bertrandi, Valisneri, and Buffon, with the latter of whom he corresponded on the subject, and the result of his observations he embodies in two brief but most important propositions:—"Nullus unquam conceptus est absque corpore luteo." (Op. min. vol. ii. p. 458.) "Corpus luteum in virgineis animalibus nullum est, ex conceptione oritur, neque prius paratum adest." The first of these propositions has never been questioned, and the truth of the second appears to us equally incontrovertible. The observations of Blumenbach were published in 1788, and nine years afterwards, or in 1797, Dr. Haighton read before the Royal Society the details of many experiments on the subject of animal impregnation, (see Philos. Trans. for 1797, p. 159,) and thus expresses himself on this point:—"I may then say that no corpora lutea exist in virgin animals, and that, whenever they are found, they furnish incontestable proof that impregnation either does exist or has preceded." (Ibid. p. 163-4.) And again he says, "I decline trespassing on your patience, and therefore lay before you only the conclusion; which is, that in the great variety of experiments on brute animals which my physiological inquiries have led me to conduct, as well as in the extensive opportunities I have had of observing the ovaries in the human subject, I have never seen a recently formed corpus luteum unattended with some circumstance or other connecting it very evidently with impregnation." (Ibid. p. 166.) In the same year Mr. Cruikshank published his account of a series of experiments also on this subject, and we find him remarking as follows:—"These calyces, on the expulsion of the ova, enlarge and become yellow, projecting above the external surface of the ovaria, and form *corpora lutea, a certain mark of conception* in all quadrupeds, and in women themselves, whether the embryo is visible or not." (Phil. Trans. for 1797, p. 200.) William Hunter and his editor, Dr. Baillie, speak of the corpus luteum as the product of conception, but do not even mention the supposition of its possible occurrence in any other way. (Description of Gravid Uterus, 1794, pp. 14–74.)

When Mr. Angus was tried in Liverpool, in 1808, for the supposed murder of Miss Burris, great doubt arose as to whether the condition of the uterus or its appendages was such as to prove a pregnancy recently existing. "It was not until after the trial that the ovaria was examined. They were then divided in the presence of a number of physicians, and a corpus luteum distinctly perceived in one of them. Mr. Hay took the uterus and its appendages to London, and showed it to the most eminent practitioners there. He received certificates from Drs. Denman and Haighton, Messrs. Henry Cline, Charles M. Clarke, Astley Cooper, and Abernethy, all stating that it exhibited appearances that could alone be explained on the idea of an advanced state of pregnancy. *And it appears to have been universally allowed that the discovery of the corpus luteum proved the fact beyond a doubt.*" (See Report of the trial; and Edinb. Med. and Surg. Journ. vol. v. p. 220.) In addition to the authorities here cited, we may be allowed to add the result of our own observations, which have been now continued through a period of more than six years, during which time we never omitted a single opportunity within our reach for examining the bodies of women of all ages, and under all the varying circumstances of virginity, after intercourse, during gestation, and subsequent to delivery at different periods from conception; these opportunities having been afforded by more than one large hospital, as well as in private practice. We have also dissected hundreds of the inferior animals with reference to this point, and have in our museum preparations of ovaries exhibiting the corpus luteum in different conditions in the human female, and also in cows, mares, sheep, sows, goats, bitches, cats, hares, rabbits; and our firm conviction is of the truth of both Haller's propositions, viz. that "*conception never happens without the production of a corpus luteum*," and that "*the corpus luteum is never found in virgin animals, but is the effect of impregnation.*" And we think that those who have supposed or asserted that they may exist without impregnation, and of course be found in the virgin ovary, have been led into the error by confounding appearances and structures essentially different, and in fact having only one character in common, which is their colour, altogether forgetting that "every yellow substance in the ovary is not a corpus luteum." (*Meckel*, supra citat.) It is allowed by those writers that "the corpora lutea of virgins may in general be distinguished by their smaller size, and by the less extensive vascularity of the contiguous parts of the ovarium." (Mr. Stanley and Dr. Blundell.) Now we have seen several of these virgin corpora lutea, as they are unhappily called, and have preserved several specimens of them, and according to our experience they differ from those of impregnation in all the following particulars:—1. there is no prominence or enlargement of the ovary over them; 2. the external cicatrix is wanting; 3. there are often several of them in both ovaries, especially in patients who have died of tubercular diseases; 4. they are not vascular, and cannot be injected; 5. their texture is sometimes so infirm that they seem to consist merely of the remains of a coagulum, and at others appears fibrocellular and resembling that of the internal structure of the ovary, but in no instance did we ever see them presenting the soft, rich, and regularly glandular appearance which Hunter meant to express when he described them as "tender and friable like glandular flesh;" (Description of Gravid Uterus, p. 14,) 6. they have neither the central cavity, nor the radiated cicatrix which results from its closure.

[Recently, however, Dr. William Davidson (*London and Edinb. Monthly Journal of Med. Science*, Dec. 1841,) has published three dissections of females—not one of whom was pregnant, yet, in each, corpora lutea were found. They all possessed the characters assigned them by Dr. Montgomery,—a central cavity or fibrous coagulum; an oval shape, and a radiated white cicatrix in the centre, just about the central body;—the body being at the same time *immediately* under the peritoneal coat. This last point is dwelt upon

by Dr. Robert Lee, who maintains, that false corpora lutea are never observed in immediate connection with the peritoneum, a small portion of stroma intervening. One of the females had been in a weakly condition for some years, and had no children; another was unmarried, and had menstruated three days previous to her death; of the third, there was no history, but all the organs were healthy, and the Fallopian tubes and uterus were in every respect natural. Dr. Davidson expresses his confident opinion, that in none of the cases had there been impregnation prior to the appearance of these bodies; and he refers to Professors Alison, Allen Thomson, John Reid and Mr. Goodsir, in proof of the accuracy of his statement, and of their perfect resemblance to true corpora lutea. Dr. Davidson states, as the result of his investigations, that he is led to believe, that impregnation cannot take place without the appearance of a true corpus luteum, but that a true corpus luteum may appear independently of impregnation.]

Signs of Delivery.

An investigation into the proofs of delivery, whether undertaken with reference to circumstances of a social, professional, or legal nature, although not so frequently required, will be found no less important in its relations to society, nor less difficult in its details, than the examination of the proofs of pregnancy, a very clear and accurate knowledge of which latter is indispensably necessary to enable us to arrive at a satisfactory conclusion, when engaged in such an inquiry as that before us. It may, and indeed frequently does happen, that a woman with an enlarged belly arising from some purely accidental or morbid cause becomes an object of suspicion, and afterwards the sudden reduction of her size may, however unjustly, affix upon her the imputation of clandestine delivery at least; and although such charge may never be made the subject of a legal or criminal investigation, its influences would be alike unjustly prejudicial to the character of the individual, and injurious to the moral interests of society. The writer very lately saw such an instance in the case of a woman separated from her husband, who became affected with what was considered ovarian dropsy, and which enlarged the abdomen to the size of six months' pregnancy, some of the other symptoms of which state were also present. After an attack of inflammation, during which it is to be presumed the parietes of the tumour formed an adhesion with the upper part of the vagina, there took place suddenly a discharge of gelatinous fluid from that cavity, and the abdomen completely subsided in the course of a day, and the previously entertained suspicion appeared to be confirmed beyond a doubt; but on examination the woman had not about her one of the signs of delivery; yet had not the case been at once investigated, loss of reputation at the least would have inevitably, though most undeservedly, followed. In a very interesting case related by Fodcré, the life of an innocent woman was very near falling a sacrifice to the law under circumstances somewhat similar. "A young woman had her menses suddenly suppressed in consequence of a fright, and sought every aid to restore them without effect: she was at length married with a view to induce their return, which succeeded after a time, and she discharged a great quantity of fetid matters. This fact was proved by the husband and the medical attendants. It so happened just at this period that two children were found exposed and destroyed by cold; suspicion fell on this young woman, because she was known to have had an enlarged abdomen, which had very suddenly subsided. The judges of the district ordered her to be arrested and examined by a physician, a surgeon, and two midwives, who reported that they had discovered marks of delivery. In consequence of this, the unfortunate woman was condemned to death for concealing her pregnancy, and making away with her children. An appeal, however, was made to parliament against this sentence; and in consequence of two consultations, held by several physicians and surgeons of the greatest eminence, she was acquitted." (Méd. Légale, tom. i. p. 476.)

Delivery may be *concealed* with the hope of saving shame, or still more criminally with the intention of destroying the offspring; and where infanticide is charged, the law requires proof of delivery, and the finding of the child. Or again, delivery may be *feigned* for the purpose of obtaining marriage with a paramour, to gratify the wishes of a husband, or to wrest property from the lawful heir. Perhaps the most singular case of the kind on record is that related by Capuron, (Méd. Légale relat. aux accouchemens, p. 110), in which a young woman, with a view to obtaining marriage with her lover, feigned pregnancy and then delivery, and so far succeeded completely in her attempt; but after some time, being called on to produce the child, and refusing to do so, she was accused of infanticide, and brought before the criminal tribunal, where she confessed the fraud which she had practised, and the motives by which she had been actuated; but she was then called on to prove that she had never been delivered, and an investigation by medical examiners was ordered, the result of which was a report that they could find no sign of delivery of either recent or ancient date, whereupon she was acquitted and discharged. A similar instance of pretended delivery appeared not long since in a Berlin journal, as having occurred at Sirakovo in the circle of Posen, where a young woman, anxious to fulfil the ardent desire of her husband to have an heir, pretended to have been suddenly and unexpectedly delivered, and stole an infant to support the falsehood: the case was rendered more atrocious from the real mother having in consequence of the theft been subjected to the accusation of infanticide; the fact was, however, happily discovered, and the culprit consigned to the punishment due to her crime. (See Paris and Fonblanque, vol. i. p. 250.) Dr. Male tells us that a surgeon was called to a pretended labour, and a dead child presented to him, but there was no placenta; he therefore proceeded immediately to examine the woman, when he found the os tincæ in its natural state, nearly closed, and the vagina quite contracted: the fact was that the woman had never been pregnant, and the dead child was the borrowed offspring of another: it appeared that she was induced to practise the ar

tifice to appease the wrath of her husband, who frequently reproached her for her sterility.

With reference to whatever object this inquiry may be entered on, it is very important to consider, in limine, what are the limits of time within which the signs of ordinary delivery can be detected, and also whether a woman who has given birth to a child necessarily retains any mark or symptom by which her delivery can be ascertained after an interval of many months or years. With reference to the first of these questions, it must be recollected that there is a remarkable difference in the effects produced by parturition on the system of different individuals, as well as in the merely physical changes made in the condition of the parts more immediately concerned in that process, arising partly from the greater strength or tonicity in the constitution of particular persons, and the consequent rapidity with which the parts restore themselves to their original state, and partly depending on the period of pregnancy, and the size of the ovum or fœtus which has been expelled. As a general rule, however, it is agreed on by all who have directed their attention carefully to the subject, that the time within which we may expect satisfactory information has certainly expired when ten days have elapsed from the time of delivery; but we are not to assume this extension of the time suited for the inquiry as implying that we may safely postpone our examination so long, or that up to the end of that period we can obtain all the evidence we require: such is by no means the fact, and experience will soon convince us that in general within a week the condition of a healthy woman who has not sustained any accident in delivery is so restored as to render the result of any such investigation a matter of much uncertainty; many of the most marked alterations in the parts of generation disappearing, "so as to leave no trace remaining eight days after delivery." (*Baudelocque*, vol. i. p. 115. See also *Foderé*, tom. ii. p. 17. Marc, Dict. de Méd.tom. i. p. 228.) Such also was the opinion of Bohn and Albert, in conjunction with Antoine Petit and Louis, when they met in conference on the case of a woman of Nantes who was accused of infanticide, and whom they pronounced innocent on the grounds of her not having been examined as to the fact of her delivery until after the expiration of a month. We were not long since called on to examine a woman five days after delivery at the full time, and were particularly struck with the degree in which the parts had restored themselves to their natural condition, especially the os and cervix uteri, which hardly differed from their natural unimpregnated form and size. If the contents of the uterus have been prematurely expelled, the signs of delivery, at whatever time investigated, will be found indistinct in proportion to the immaturity of the ovum; so that, after abortion at an early period, so little change is made in the condition of the uterus and other parts, and the woman may exhibit otherwise so few of the signs of pregnancy even when examined within a day or two after the occurrence, that it may be found impossible to form anything approaching to a decided opinion,* excepting a very careful examination of whatever substance may have been expelled, should that be within our reach; when, if the structures of the ovum be satisfactorily detected, and we have sufficient proof that such body was expelled by the woman, there can no longer be any doubt. While writing these observations we are in attendance on a lady who miscarried a few days since, with little or no pain, but with considerable hemorrhage, at the close of the second month; and in twenty-four hours afterwards we found the os and cervix uteri almost completely restored to their natural state; the vagina and external parts hardly if at all dilated and very little relaxed; the breasts exhibited very imperfectly the appearances which accompany pregnancy, the ordinary sympathetic symptoms of which had been almost entirely absent. Now in such a case as this it would be utterly impossible to arrive at more than a very ill-established probability except by finding the ovum, which in this case was expelled entire and perfect, in which state we have preserved it.

As to the second point, or our being able to ascertain by personal examination whether a woman has ever at any former period been delivered or not: it is plain that we may be able to establish the negative of the question from the existence of some physical condition, such as a perfect hymen, which would be incompatible with the birth of a mature child; this would not, however, prove that abortion had not taken place; but such a state of imperfect development or of imperforation might be discovered, as would preclude altogether the notion of either pregnancy or delivery. But the question of most practical importance is this, — supposing a woman to have been a mother, does there remain any mark or sign by which the fact of delivery can at any future period be established? The reply to this question which experience warrants appears to be, that in a very great majority of cases we should be totally unable to discover any such certain indication of a former delivery; for although in some instances there are to be found appearances which point strongly to a probability of such an occurrence having taken place, they are very seldom indeed such as ought to be considered decisive of the question; while in other cases where parturition has occurred repeatedly, not one of the signs usually insisted on is found to have continued permanent. We very lately examined a patient who had borne five children and nursed three of them, the youngest being now five years old; the breasts were small, but neither flaccid nor pendulous; the nipples short, with not the least shade of brown colour in the areolæ, which exhibited only the delicate rose colour so often observed on that part of the virgin breast; there were neither lines nor spots of any kind on the abdomen; the os uteri was small and natural; the vagina contracted, and the fourchette perfectly entire. It should be mentioned that this lady never carried her children beyond the end of the eighth month. But the remarkable case of Aimée Perdriat, related by Foderé, (Tom. ii. 18,) shows very forcibly that the lapse of a few weeks may be sufficient to render impossible the detection of

* "Avant les deux premiers mois revolus de la grossesse surtout lorsqu'il ne s'agit pas d'une primipare, l'art ne presente aucun moyen concluant de determiner par l'examen de la femme si un avortement a eu lieu." — *Marc*, Dict. de Méd. vol. iii. p. 193.

the signs of delivery : the facts were briefly these : — On the 11th of June, early in the morning, Aimée Perdriat left her master's house and went to that of a friend named Rosina, living in the fifth story of the house, begging permission to lie down, as she was unwell with colic : in about an hour afterwards a person living in the third story heard an extraordinary noise in the water-pipe, as if a heavy body was falling forcibly through it. Aimée was not visited by any one except Rosina and another young girl, who came to ask if she wanted any thing. About five hours afterwards Rosina observed blood on the stairs and on the floor of the room, and Aimée remarked that her menses were flowing very profusely. Suspicion was excited, and on the 17th the privy was opened, when a child, placenta, and two bloody cloths were found. Two surgeons examined the body, and reported that there were no marks of violence present, except that the umbilical cord was *torn* off; that it was a full-grown child, and in their opinion had breathed after birth, and had fallen alive into the place from whence it was taken. Aimée was arrested on suspicion of being the mother of this child, and the suspicion was increased by her refusing to submit to the examination of a midwife, and having absconded from Paris : she was brought back, and on the 15th, 17th, and 27th of July, being more than a month after the supposed delivery, she was examined by Baudelocque, Dubois, Ané, Dupuytren, and Lafarge, who declared that they could not discover any sign indicative of delivery having taken place at the time in question. In consequence of this she was acquitted, the judges leaning to the side of mercy; but the circumstances of the case must impress us with a moral conviction of the woman's guilt.

The presence of shining broken streaks, like the remains of cracks, in the skin of the belly, caused by the previous distension of that part during gestation, and which when once produced are permanent, is a sign very generally acknowledged as of value; but then we have just seen that a woman may have been repeatedly delivered without the formation of any such marks; and on the other hand we know that any cause capable of stretching the abdominal integuments to the same degree may equally give rise to their production; a remarkable instance of which we lately saw in a man labouring under general dropsy, whose abdomen was literally covered with such streaks, and there were also several on the thighs, prepuce, and other parts of the body. It sometimes happens also, especially in young women of a full habit, that when the breasts have been greatly and rapidly enlarged during pregnancy or after delivery, the skin covering them is in like manner injured, and silvery lines are formed which never afterwards disappear. We have already related the particulars of a case in which we discovered, by the presence of these marks, a delivery which had taken place two years before; and this day, in consultation with Surgeon Connolly on a case of doubtful pregnancy, where previous childbearing was at first resolutely denied, the recognition of these silvery streaks induced us to press the party strongly on the subject, when she confessed that she had given birth to a child nineteen months before.

[These marks are sometimes accompanied by a brown line, extending from the pubis to the umbilicus, (Montgomery, *Signs and Symptoms of Pregnancy*, 6th edit. p. 171, Lond. 1842); and accompanying this dark abdominal line, Dr. Montgomery has, in a few instances, observed another appearance of a similar kind, which consists of a dark-coloured circle or areola, surrounding the umbilicus, extending in breadth about a quarter of an inch all round that part, and in general, but not always, varying in depth of tint according to the colour of the hair, eyes, and skin of the woman. Unlike the mammary areola, there is no turgescence or elevation of it above the surface of the surrounding skin, nor are there any prominent follicles upon its disk.

Whether it is ever produced under circumstances unconnected with pregnancy, remains to be determined by further observation. (*Dublin Journal of Medical Science*, May, 1844, p. 298; see, also, Dr. R. Turner, in *Lond. and Edinb. Monthly Journ. of Med. Sciences*, Aug. 1842, and Sept. 1844, and Dr. J. R. Cornack, *Ibid.* Feb. 1844.)]

It may be satisfactory to inquire here, whether there is any other affection of the mammæ which might give rise to such a condition of their surface. The mere accumulation of fat we certainly think would not, and the existence of diseased enlargement would not be likely to give rise to mistake; but there is one fact on this subject which deserves to be borne in recollection,—namely, that the application of leeches to the breasts as a means of restoring the menstrual discharge, lately recommended by Dr. Loudon, (Edinburgh Med. and Surg. Journ. vol. xxxviii. p. 61,) has been followed, as he tells us, by these organs becoming "swelled to an enormous degree;" and as this swelling takes place very rapidly, it seems reasonable to suppose that it might produce a similar disorganization of the integument; but we have no evidence from experience on the subject. We have, on several occasions, when examining the state of the os uteri in women who had borne children, observed that its labia felt jagged, and sometimes as if a portion had been torn and remained separated from the rest: we should attach some consideration to this state of the part, because it is not likely to be produced by the expulsion of any accidental formation from the cavity of the uterus, and we have never met with it except after childbirth. The value of the evidence to be obtained from a lacerated state of the perineum will be fully considered presently. Before proceeding to investigate in detail the present circumstances of any case submitted to us for examination, we should endeavour to possess ourselves as fully as possible of the previous history of the woman, if that be not already known to us, which may have been on the one hand such as would greatly tend to render probable the occurrence of delivery, or on the other hand to diminish, or perhaps altogether forbid, our belief in its possibility. We may, for instance, learn that she had been for several months observed to be increasing in size, and exhibiting other symptoms

of pregnancy previous to the time at which delivery was suspected to have taken place; or we may have reason to know that she had been long labouring under some form of disease, which, while it rendered the occurrence of pregnancy extremely improbable, was at the same time such as would be likely to induce many of its symptoms. The age also of the individual may be such as would tend greatly to confirm us in a negative opinion; and even supposing that we are satisfied that conception had occurred, this may in no measure facilitate our investigation, but may, on the contrary, involve us in further difficulty. It has been already shown that a woman may be pregnant, and that the fruit of her womb may be blighted at any period, but may be retained in utero until the full time is accomplished, while the size of the abdomen happening from some other accidental cause to continue increasing until the expulsion of the degenerated ovum occurs, the woman may be suspected of having brought forth a child; nay, it may even happen, however paradoxical such an assertion may at first sight appear, that pregnancy and utero-gestation, even when their full term has been nearly accomplished, and the life of the fœtus distinctly recognised, are not necessarily followed by the birth of a child, as is proved by the facts of the following very remarkable case which the writer saw about three years ago with surgeon Whitestone and Mr. Mulock. Mrs. C. of Charlemont-street became pregnant for the fourth time, and up to the seventh month matters went on favourably; but after that time she ceased to feel the motions of the child, which had been previously very active; she, however, continued to increase in size up to the end of the ninth month, when the membranes having protruded into the vagina and ruptured, a great quantity of horribly offensive fluid and gas made their escape, but no child could be discovered: in a few days afterwards the placenta and cord came away completely macerated, and all the interstitial matter so completely removed as to present a most perfect ready-made preparation of the umbilical or placental vessels, even to the most minute capillary terminations, (it is preserved in the writer's museum); but nothing remained of the child except the bones, many of which were subsequently discharged from time to time during the two years which the patient survived. The facts of this case appear to us sufficient in themselves to demonstrate the imperfection of the rule of law concerning concealment of birth, in order to prove which it is held sufficient to ascertain that there has been a pregnancy or a delivery; for in this case pregnancy was clearly ascertained, the motions of the child were strongly felt, and the full term of gestation was accomplished, yet no child was born. It may also be observed here, that should such a case as this give rise to the suspicion of infanticide, the accusation could not be sustained, because, in order to do so, the existence of the child must be proved and its body found; and in suspected cases, whether of *concealed* or *feigned* delivery, we should very carefully examine the child if possible, for the purpose of ascertaining whether its state corresponds to the supposed or pretended time of delivery, and to the other circumstances of the case, as by so doing the attempted fraud may sometimes be at once detected. If, for instance, a woman feign to have been delivered two or three days before, and produce as her own a child with the cord separated and the umbilicus quite healed; or, on the contrary, if delivery be asserted to have taken place a month before, and the cord be found still attached to the navel, such incongruities would be so far decisive against the truth of the woman's account. Other discrepancies, such as want of correspondence between the development of the child and the period of pregnancy accomplished, or the interval after delivery, will readily suggest themselves, and ought to be very carefully attended to. Having made these general observations, we have next to consider in detail the individual signs by an examination of which we may be enabled to form an opinion as to the recent occurrence of delivery, when such inquiry is instituted within a proper time after parturition is supposed to have taken place.

1. The face is generally a little paler than usual, the eyes are somewhat depressed, and not unfrequently surrounded by a slightly brownish circle, and the whole expression of the countenance resembles that of a person recovering from a slight indisposition; the pulse is more or less accelerated, the skin softer and warmer than usual, and relaxed with a moisture which has in many a peculiar and sometimes very unpleasant odour.

2. The state of the breasts ought to be a subject of particular attention, especially if examined about the third or fourth day after delivery, at which time they are generally full, tense, and hard, or even knotty under the hand, and if pressed or drawn they yield a lactiform fluid; the nipples appear turgid, and the areolæ are dark and otherwise altered, as already fully described.

3. The abdomen is found full, and its integuments greatly relaxed or even thrown into folds, especially in those who have borne several children; and we recognise those light-coloured broken streaks or cracks already mentioned, which are generally most numerous from the groins and pubes towards the umbilicus; and if the hand be pressed pretty firmly over the lower or pubic region, we feel,—4, the uterine tumour produced by the volume of the imperfectly contracted uterus, which is felt about as large as the head of a newborn child, and rising three or four inches above the brim of the pelvis, into the cavity of which it can be traced by the hand, and lying towards one or other side.

5. The state of the os uteri, vagina, and external parts, next claims our attention. By an examination per vaginam we detect the enlarged state of the uterus and its identity with the abdominal tumour, and at the same time we ascertain the condition of the os uteri, which in a recently delivered woman is found gaping open, so that two or three fingers might be introduced into it with ease; its margins are flabby and very much relaxed, and not unfrequently feel as if divided by several small fissures. If the examination happens to be made within a few hours after delivery, the patulous state of this orifice is such that its margins cannot be distinctly recognised, so that we feel at a loss to distinguish between it and the cavity of the vagina, of which it seems as if it

were a continuation. This latter part also is greatly relaxed and dilated, in consequence of which its internal surface is rendered smooth, its natural rugæ being obliterated by the recent distension of its tissues. From the same cause, also, the external parts are swollen, not unfrequently contused or even torn, especially after a first or a difficult labour, and partake of the relaxed state of the internal parts; there is also found issuing a peculiar discharge, to which we apply the name of lochia.

6. Laceration of the perineum. When a woman for the first time gives birth to a full-grown child, it frequently happens that the thin fold of integument constituting the anterior edge of the perineum, and called the fourchette, is torn, and sometimes the rent extending further backwards divides the proper substance of the perineum to a greater or less extent; this, however, is merely a contingency, which may or may not take place, and is, in fact, of rather rare occurrence, except in the simpler form first mentioned, but if recognised in the greater degree, is a very strong proof of delivery having preceded.

7. The lochia. From the time of delivery, a sanguineous discharge is eliminated from the genitals, and continues to flow for a period varying between four or five days to as many weeks, according to the peculiar habit or constitution. In general the discharge continues red for the first three or four days, and then becomes nearly colourless, or acquires a slightly brownish or dirty greenish hue, from which it is sometimes vulgarly called *green waters*, and after a week or eight days it ceases altogether. This discharge has a peculiar odour, (*Marc*, Dict. de Méd. tom. i. p. 227; *Foderé*, t. ii. p. 13,) not easily named. Loder compared it to the smell of "fish-oil;" others speak of it as a sour smell, but any one who has been much about lying-in women, especially in the wards of a lying-in hospital, must be aware of the peculiarity of this odour, which Dr. Beck informs us it has been found impossible by any artifice to destroy. (Elem. Med. Jurisp. p. 94.)

Should such an assemblage of symptoms as are here enumerated be recognised as at once existing in the case submitted for examination, no doubt could be entertained of the fact of delivery, there being, to use the words of Chaussier, "no disease or affection besides parturition which can possibly produce the whole series of signs above described;" but we may not enjoy the advantage of having before us such a satisfactory combination of proofs, and may be under the necessity of forming our opinion when only some of these signs can be detected, and others are entirely absent; and when we come to examine them separately, we shall find that they must be received in evidence with very great caution, and with various modifications of their value, by which the proofs which they afford will be found little more than merely presumptive. Thus it is obvious that the expression of the countenance, as well as the state of the pulse and skin above noticed, may be induced by any indisposition or exertion which may have depressed the bodily strength of the woman, and otherwise disordered the functions of her system. The state of the breasts has been already very fully considered in the former division of this article, so that it appears only necessary to observe here that, as on the one hand such a circumstance as the expulsion of hydatids is capable of inducing great functional activity in the mammæ and an abundant secretion of milk, so on the other hand it occasionally happens in weak, delicate women, that little or no alteration is perceived in the breasts after delivery; and it was elsewhere remarked that in such persons a similar want of sympathy is sometimes observable during pregnancy, so that the changes in the areolæ are but imperfectly established. Still we are fully warranted in considering a full breast, with abundance of milk about the third or fourth day after delivery is supposed to have taken place, as a very strong indication of such an occurrence. "It is possible," says Mr. Burns, "for this secretion to take place independently of pregnancy, but not with the appearance just described."*

The fulness of the abdomen and relaxed state of the integuments, as well as the appearance of streaks or cracks, may all arise from any cause capable of producing the same degree of distension as occurs in consequence of pregnancy, such, for instance, as dropsy or enlarged ovary, or they may be the result of a former pregnancy; while, on the other hand, they may not be found when delivery has really and recently occurred. As to the uterine tumour, we must expect to find it distinct or otherwise in proportion to the recency of the delivery and the period of pregnancy at which it took place, the fatness or tenuity of the abdominal parietes, and the degree of activity with which the contractile action of the uterine fibres may have produced, from which results in a great measure the difference in the degree of development which this tumour presents in different persons at the same interval of time after mature parturition, being smaller, and in consequence less easily felt in some at the end of four or five days than in others after double the time. Besides this, a tumour may be felt so situated, and yet may not be the uterus. To satisfy ourselves on this point, we must conjoin the examination per vaginam with that already made externally; and even when we have ascertained the exact nature of the tumour, we must recollect that it may equally arise from the organ having recently expelled a mole, a large mass of hydatids, or even a considerable accumulation of retained menstrual discharge; (see section *Suppression of the menses*,) which accidental circumstances might also produce the dilated and relaxed state of the os uteri, in which the vagina and external parts would participate. But from such causes as these there would be found neither swelling, contusion, nor laceration of the internal organs; nor could the os uteri be rendered patulous merely by increased secretion, such as long-continued leucorrhœal discharge, which sometimes induces extraordinary relaxation of the other parts. Laceration of the fourchette, although a very common occurrence in childbirth, does not always take place. We have

* Principles of Midwifery, seventh edit. p. 547. It appears proper to notice here a remarkable discrepancy between the opinion of Mr. Burns, as above stated, in his own words, and as quoted by Dr. Beck in his Elements of Medical Jurisprudence, third edit. p. 94, where he is made to assert the exact contrary, the word *impossible* being substituted for *possible*, as it stands in the text.

already spoken of a lady who bore five children without sustaining any injury to that part; and within the last few days we examined a young girl of sixteen, and of very diminutive stature, who had borne a full-grown child some months before, and the fourchette escaped uninjured. Many such instances as these have come under our observation, (see also *Marc*, loc. cit. and *Foderé*, tom. ii.); but should a laceration of the perineum be discovered, it is a proof of immense importance. We must, however, recollect that it may present itself under conditions indicating a more or less remote date as that of the delivery which caused it: thus it may be found a fresh unhealed wound, or the margins of the laceration may be perfectly healed or even callous, but quite disunited and separate from each other; or, lastly, complete union may have taken place, so that the presence of a rigid cicatrix is the only evidence remaining of the occurrence of the accident. Now should we happen, in an examination of this kind, to discover a fresh laceration of the perineum, in connection with others of the signs we have been considering, especially the relaxed and dilated state of the os uteri, vagina, and external organs, and the presence of the abdominal tumour, it ought to be considered as decisive of the fact of recent delivery; but neither of the other states of the parts would be equally conclusive as proof of a *former* delivery, because they might have been produced by causes totally unconnected with childbirth, as happened in the case of a girl who was romping with a young man, and, losing her balance, fell backwards on the point of the leg of a stool, which tore through the perineum and entered the vagina, causing a frightful laceration. Or it may have been caused by some surgical operation on the part, as in the case related by M. Berard, where it was found necessary to divide the perineum in order to accomplish the removal of a pessary which had lain several years in the vagina. (Journal Hebdomadaire, tom. i. p. 263.) About two years ago a patient applied to the writer for relief, as she was labouring under prolapse of the uterus and incontinence of urine: on examination there was also found extensive laceration of the perineum, but none of these accidents were the result of delivery. The unfortunate woman had led an abandoned life, and was the victim of a horrid outrage committed by three or four drunken ruffians, who, having first violated her, forced a broken stone into the vagina, which tore the perineum and the neck of the bladder. The stone had been removed in the hospital, but the lacerated parts never recovered the injury. As to the lochia, we cannot expect to obtain much information of a satisfactory kind from that source, especially if the examination is not made very soon after delivery. We have known the discharge cease after the second day; and even when this is not the case, we must take care that we do not confound with it some discharge of a different nature, such as the menstrual, or perhaps one of a morbid origin, from either of which, however, a careful examination of the uterus and external organs would almost certainly enable us to distinguish it.

It appears to us that we cannot more appropriately conclude this review of the ordinary signs of delivery than by quoting the words of two very distinguished writers on such subjects. "The relative value," says Dr. Paris, (Medical Jurisprudence, vol. i. p. 253,) "which each of the signs possesses will be better appreciated after we have considered the diseases whose effects may resemble them; but as a general principle we are anxious to enforce the necessity of always considering the consecutive signs of parturition collectively, and not individually; under such circumstances the practitioner can never be betrayed into an erroneous conclusion." "Other circumstances," observes Mr. Burns (Principles of Midwifery, seventh edit. p. 547), "may also concur in confirming the opinion of the practitioner; as, for instance, if the patient give an absurd account of the way in which her bulk suddenly left her, ascribing it to a perspiration, which never in a single night can carry off the great size of the abdomen in the end of a supposed pregnancy.

Delivery without consciousness.—Having in a former part of this article discussed the possibility of impregnation being effected without the woman's knowledge, as during sleep, and having alluded to the fact of delivery sometimes taking place under similar circumstances as an argument *à fortiori* in favour of the credibility of such an occurrence, it seems necessary now to consider briefly that question. That a woman may be delivered without being sensible of it, if she be at the time labouring under cerebral oppression or derangement, as in coma, in delirium, in puerperal convulsions, stupified by narcotics, (as in the celebrated case of the Countess St. Seran, *Causes Célèbres*, Cause 259), or by ardent spirits (see case by M. Deneux in the Dict. des Sciences Méd. tom. xxxi. p. 212), is a fact of repeated observation; but it is not pretended that in such instances the woman could be *afterwards* ignorant that she had been delivered. The occurrence of delivery after the life of the mother has become extinct, and consequently effected by the independent contractile power of the uterus, has been attested by so many authors of established credit, that we cannot refuse it our belief; having received the testimony of Foderé (Méd. Lég. tom. ii. p. 11), Buffon (see *Gardien*, vol. ii. p. 212), Lereux (Obs. des pertes des Sang. Obs. xiii. p. 25), Levret (Art des Accouchemens), Baudelocque (Art des Accouchemens, tom. i. p. 123, note, ed. 1822), Bichat (Anatomie Descriptive, tom. iv. p. 392, ed. 1829), and others* of equally high authority, who have recorded instances of the fact, to which for the present we shall merely refer, as below, and proceed to notice two or three facts more directly in proof of delivery during sleep or insensibility. For the first of these the writer is indebted to Dr. Douglas, one of the most experienced practitioners in this city, and whose correct and ingenious exposition of the evolution (improperly called spontaneous) of the fœtus is so well known to the profession. In a letter to the writer, Dr. Douglas states that he was called about six o'clock A. M. on the 26th September, 1828, to attend Mrs. D. of the county of W——, but then residing in

* See *Hartemann*, Act. Nat. Curios. Dec. II. an. 3 Dict. des Sc. Méd. vol. xxxi. p. 212. Journ Univ. des Sc. Méd. Août 1817. Lond. Med. and Phys. Journ. vol xlvii. p. 26. Dr. *Planque*, Bibliothèque de Méd. Choisie vol. iii. p. 222.

Eccles-street. On his arrival he found the house in the utmost confusion, and was told that the child had been born before the messenger was despatched for the doctor; and from the lady herself he learned that about half an hour previously she had been awakened from a natural sleep by the alarm of a daughter about five years old, who had slept with her for some nights before; and this alarm had been occasioned by the little girl feeling the movements and hearing the crying of an infant in the bed: to the mother's great surprise she found she had brought forth her child without any consciousness of the fact. Mrs. D. had had several children with favourable labours. In the London practice of Midwifery (Fifth edition, p. 87. See also Barlow's Essays on Surgery and Midwifery, p. 182), a work generally ascribed to a very distinguished practitioner, we find the following account. "A lady of great respectability, the wife of a peer of the realm, was actually delivered once in her sleep: she immediately awaked her husband, being a little alarmed at finding one more in bed than was before." To these accounts we wish to subjoin the details of a very remarkable case, from a source which leaves no doubt of the accuracy of the relation. "A fright produced by the dangerous situation of her only son, when eighteen months old, brought on in Mrs. Durant an alarming illness attended with some singular phenomena, the most singular of which respected her memory. The illness happened in July; she was then advanced six months in a state of pregnancy, and was, when perfectly insensible, delivered of a child. On awakening from the insensibility, which had continued for three days, she imagined it was the month of *January*. Her mental powers were but slightly impaired, and soon regained their former perfection; nor was her memory affected except as regarded the preceding six months: of that time she had forgotten *all* the events. Some accidental circumstance might afterwards occasionally produce a train of thought, which would bring an event of that six months to her recollection. Several of the most important, however, were never regained, *nor could she, I believe, to the hour of her death remember that she had then been pregnant.*" (Durant's Memoirs of an only Son, vol. i. p. 147.)

[A case of parturition without uneasiness, and without the least exhibition of consciousness of the child's expulsion, has been published by Mr. Rawson, (*London Lancet*, Nov. 27, 1841; and Dr. T. R. Beck, in *Amer. Journal af the Med. Sciences*, April, 1842, p. 491.) The writer was called, some years ago, to a female, who informed him, that she awoke suddenly in the night, with scarcely any uneasiness, and found both the child and placenta extruded.]

Examination after Death.—Having elsewhere described the signs of pregnancy which may be discovered after death, it will not be necessary now to say much in addition to the observations already made. In such an examination our attention should be directed to the same objects which we have been just considering as the proofs of delivery which may be recognised during life, almost all of which may be also ascertained after death, provided, as before insisted on, the investigation be undertaken within a proper time: in addition to these means, by opening the body we are enabled to satisfy ourselves more precisely of the exact condition of the uterus and its appendages. Should death take place during or immediately after the act of parturition, especially from hemorrhage, the uterus may be found lying in the abdomen, a flattened flabby bag, from eight to ten inches long, its mouth gaping wide open, so that the hand would pass through it without resistance; its parietes are soft and relaxed, its cavity often containing large coagula of blood, and its internal surface covered with the soft and pulpy remains of the decidua, which, if the part be immersed in fluid, appear as flocculent processes adhering to and springing from it in great numbers, (see preparation No. 141 in the writer's museum,) while the portion to which the placenta had been adhering is distinguished by having less of these deciduous flakes, the substance of the organ in that situation appearing as if laid bare, and exhibiting several semilunar and apparently valvular openings in its structure. But these conditions will be greatly altered should the woman have survived delivery a few days, so as to afford time for the uterus to contract; and the change produced will be in proportion to the time since delivery and the energy with which the organ may have exerted its contractile powers, so that in some instances it may be found as large at the end of a week, as in others where the examination is made within two or three days. It would therefore be very difficult, if not impossible, to assign the exact dimensions which the uterus will present at given periods after mature delivery; and should it have occurred prematurely, these dimensions will of course be thereby still further affected. When delivery has taken place at the full time, and the uterus has contracted perfectly, if an examination be made within a day or two, it will be found about seven inches long and four broad; its external surface having a vascular appearance, and not unfrequently presenting patches of a purplish colour; its substance, divided by the knife, is found from an inch to an inch and a half thick, of the consistence, and nearly of the colour, of firm muscular fibre, of which it appears to consist; and the cut surface displays the orifices of a great number of very large vessels. Its internal surface differs little from the description already given; the Fallopian tubes and ovaria, or at least one of the latter, are found turgid and vascular, and lying more confined to the sides of the uterus. At the end of a week the organ has diminished to a length of between five and six inches, and after a fortnight does not exceed five inches in length; its vascularity is diminished, and the thickness of its parietes reduced about one-third; but the density of their structure is found increased in a like proportion, so that the orifices of the vessels are much less distinct, and the colour of the muscular substance has become much paler. After this period little information is likely to be obtained from an examination of the uterus merely; for although it probably is not reduced to its original unimpregnated condition before the end of the fourth week, the alterations which can be appreciated towards the conclusion of that period are too liable to have been induced by contingent causes to allow of our attaching value to them as proof of delivery

Under such circumstances, our attention would be more profitably directed to an examination of the ovaries and the existence of the corpus luteum, the value of which has been already so fully considered that it appears now only necessary to remark, that although its existence is proof positive of previous conception, it can be received as evidence of recent delivery only when it is found in connection with other circumstances indicative of the occurrence of that event, (see report of the trial of Charles Angus for the murder of Miss Burns,) in which case it ought to be considered as a very powerfully corroborative proof.

We may sum up the substance of these observations in the following general corollaries :—

1. The signs of delivery are most distinct after the birth of a full-grown child; and least so when the uterine contents have been expelled at an early period of pregnancy.

2. The proofs are more distinct in proportion to the recency of the delivery, and any examination made after the lapse of ten days from the time of the delivery is not likely to afford satisfactory information, the most decisive signs in general disappearing within a week.

3. The third or fourth day generally presents the results of delivery very distinctly, the condition of the breasts being then most remarkable from the active secretion of milk.

4. A first delivery is more easily detected than subsequent ones.

5. We cannot safely rely on any of the signs of delivery viewed separately, but must consider them collectively, and their mutual relation and correspondence with each other, and with the other collateral circumstances of the woman's case and history.

6. The chief points of attention ought to be the state of the external parts and of the breasts.

7. There are certain physical signs which, when present, are sufficient to establish a negative decision; such are, for instance, a perfect hymen, or an imperforate state of the parts.

8. But, on the other hand, a woman may have borne children, and no one mark remain by which the fact of delivery could be proved after the lapse of even a few weeks.

9. A woman may be delivered while in a state of insensibility, or even during deep natural sleep; so that her child may perish merely from want of attention, and without any moral delinquency on her part.

W. F. Montgomery.

PROGNOSIS, *προγνώσις*, foreknowledge. The important place which in medical science is justly assigned to the faculty of foreseeing and predicting the future may be inferred from a consideration of the objects which it embraces. The principal of these are—the question whether a disease is remediable—the degree of danger which attends it — its probable duration — the circumstances which may be expected to arise during its course —its tendency to recur—and the probability of other diseases supervening.

The necessity of ministering to that instinctive anxiety with which mankind contemplate the prospect of life or death, of renovated health or protracted suffering, would of itself be sufficient to rank the faculty of prediction among the most essential qualifications of the physician. It, however, derives a stronger claim to this distinction from its important influence in the treatment of disease. Nor is there, perhaps, any one qualification more adapted to produce confidence in the patient and his attendants, and thus to insure compliance with the injunctions of the physician, than the power of predicting with accuracy what will happen in the course of a disease. Again, in a multitude of cases, how powerful an ally does he obtain if he can inspire the patient with hope by his cheering predictions! On the other hand, it often happens that, in diseases attended with little danger, there is a temporary increase of disorder and suffering. If this be foreseen and cautiously announced, disappointment and despondency, such as might retard or even prevent recovery, will be avoided. There are, besides, various circumstances incident to the progress of maladies, such as the appearance of fresh symptoms, or the supervention of some new disease, which, if foreseen, may be modified, or perhaps wholly prevented; while, in many acute affections, the anticipations of those periods and conjunctures which experience has shown to be often critical, may suggest means calculated to insure a favourable and decisive effort of nature.

It is not, however, merely in its relation to the treatment of disease that the art of prognosis is important to the physician. He will find it an influential and honourable means of promoting his own reputation; and, what he should still more value, one that may often be made subservient to the dearest and most momentous interests of his patient. That he whose days are numbered by the progress of a mortal disease, should, while his powers are adequate to the task, set his worldly concerns in order, is a position which few or none will call in question; but the necessity of preparation for another and an eternal state of being can be duly appreciated by those only who have a just perception of the awful nature of the interests at stake. Such, however, may be the physical or moral condition of the patient, or such the nature of his malady, that the announcement of danger might in many cases seem calculated to accelerate the fatal event, and to counteract the measures devised for his relief. Since, then, the issue must often be foreseen by the physician alone, the question of disclosing or concealing his anticipations will frequently place him in circumstances of the most serious responsibility. It would be foreign to the proper object of this article to attempt the delicate task of establishing general rules for the solution of such questions. It will suffice to say that the judgment of physicians would be more generally sound, and their conduct more wise, in this as well as in other parts of their professional duties, if their own minds were more deeply imbued with the importance of the truths and obligations of religion.

[Should the physician, however, have any hesitation as to the propriety of communicating his unfavourable prognosis to the patient, he ought not to hesitate to put the patient's friends in full possession of it.]

The qualifications and attainments which are essential to the art of prognosis may, in general

terms, be said to comprehend all those which give superiority in the other departments of medical science. Some, however, are more peculiarly requisite. As a foundation, the accurate discrimination of disease is obviously indispensable; and hence the necessity of those habits of close observation, and of that extensive knowledge of pathology and of the signs of disease, upon which success in diagnosis depends. But in a multitude of cases the mere recognition of a disease is a very inadequate guide to the prediction of its future course and ultimate event. Something beyond this is wanted; and here we see remarkably exemplified that practical superiority which is acquired by men of clear understanding and natural good sense, who have had the advantage of long experience and an extensive field for observation.

The difficulties which are inseparable from the subject, and the sources of error and disappointment with which it abounds, are early forced, and often painfully so, upon the attention of the physician. Before, however, experience shall have taught him the lesson, he will do well to exercise great caution in his predictions. Let him bear in mind, on the one hand, that the most formidable symptoms sometimes occur when there is no real danger; and on the other, that a moment of delusive calm is often the prelude to the sudden appearance of indications of approaching death. Let him remember, that however accurate may be his diagnosis, his estimate of what is expressively called the vis vitæ may and often must be most imperfect. If such considerations as these have their due influence on his mind, he will shrink from a rashness of prediction no less injurious to his own reputation than to the welfare of those whose life and health are intrusted to his care.

Of the grounds of Prognosis. — The first and most obvious means for predicting the event of disease is derived from an attention to the increase or diminution of its more prominent symptoms. But although common sense and experience sufficiently attest the general value of this guide, a very limited extent of observation will show that the cases in which it is an imperfect or fallacious one are numerous and important. So far, indeed, is it from uniformly indicating the ultimate event of death or recovery, that it often fails to resolve the immediate question, whether the patient is getting better or worse. Experience has taught us that the most conspicuous and distressing symptoms of many diseases are, at least in part, the result of what is termed an effort of nature to obtain relief, and that their disappearance merely announces the approaching fatal termination of the struggle. Thus the anasarca which sooner or later attends most organic diseases; the sputa, colliquative sweating, and diarrhœa of phthisis; and the saccharine urine of diabetes, often cease in the extreme stage of those maladies, but cease only to give place to death. We may perhaps refer to the same class of facts that delusive calm, sometimes accompanied by an appearance of revival, which so often precedes the fatal issue of acute diseases, as, for example, of encephalic inflammation, yellow fever, and puerperal peritonitis. Experience further shows that the disappearance of one set of symptoms is often a mere precursor of others of equal or greater severity. Thus the cold stage of ague is presently replaced by the hot; and the cessation of spasmodic asthma and of scrofulous disease of the cervical glands is frequently but the forerunner of pulmonary consumption. On the other hand, in acute diseases, a marked increase in the severity of the symptoms is a common prelude to a salutary crisis; while the crisis itself consists in the appearance or aggravation of some circumstance which, either in kind or degree, is essentially morbid.

As we thus find that the apparent increase or decrease of a malady cannot be by any means uniformly relied upon as indicating its event, we must have recourse to those materials which *experience* has collected for our guidance. In its application to the prognosis as well as to the treatment of diseases, experience presents itself in a twofold character; first, as entitling us to infer that a certain event will result from certain existing circumstances, merely because it has been ordinarily found to follow them; and, secondly, as the foundation of those generalizations and deductions which constitute the science of pathology. From the age of Hippocrates to that of Morgagni, the art of prognosis, or at least what was valuable in it, was almost exclusively founded upon the former kind of experience; for whatever was derived from pathology was always hypothetical and mostly erroneous. The writings of our own illustrious Sydenham strikingly exemplify the contrast between the value of accurate observation and the fallacy of mere speculation, however ingenious.

The cultivation of pathology in modern times has unquestionably produced an important influence upon prognosis, as well as upon every other branch of practical medicine. It would be foreign to the immediate object of this article to inquire how far that influence has been beneficial, or to what extent its benefits have been associated with mischief. It may, however, be asserted in general terms, that while, on the one hand, pathology has given an increased precision to our views of the nature, and consequently of the event of many diseases, especially of those which we call organic, yet, on the other, a propensity to generalize from inadequate data, and to attribute to the science a perfection which it has by no means attained, has unquestionably led to much error. And there can be no doubt that in the present state of medical science he who combines a simple and accurate observation of individual circumstances with an enlightened but cautious application of pathology, will be found the most sagacious in prognosis as well as the most successful in practice.

The application of experience to prognosis is greatly facilitated by the aid which nosology affords in creating abstract notions of disease apart from the peculiarities of individual cases. Hence arises a natural division of the subject into two parts. The first embraces prognosis as considered in its relation to *diagnosis*, and comprehends those general conclusions as to the future which are drawn from the known history and tendency of any given disease. The second comprehends

hose particular circumstances which belong to he individual case, not being included in the abstract notion of the disease itself.

The value of an accurate diagnosis as an index of the future is often indisputably great. In many affections it at once informs us whether we must regard the disease as curable or incurable, and whether death or recovery may be expected. Thus, when the existence of hydrophobia on the one hand, or of hysteria on the other, is clearly ascertained, we are able to predict the ultimate event with a confidence little short of certainty. If a case be identified with tuberculous phthisis or schirro-carcinoma, we at once perceive that the probability of recovery is extremely small. The great majority of diseases, including fevers generally, and indeed most acute affections, are, however, in their own nature, neither essentially curable nor incurable, fatal nor free from danger; and hence, in order to predict the result, we must take into account the circumstances of each individual case: and even when the ultimate event may be learnt from the diagnosis alone, we must still have recourse to them to determine many questions of great interest both to the patient and the physician, as the duration of the disease, the event of particular symptoms, the expectation of new ones, &c. Numerous cases also occur in practice, to which diagnosis is wholly or in a great measure inapplicable; and although in judging of the future some light may be derived from their apparent analogy to known diseases, much will necessarily depend on a consideration of individual circumstances. But not only is diagnosis in many cases unattainable, it is also often unnecessary. How much of that tact which experience gives is independent of any pretensions to accuracy in referring a case to its nosological position! This is remarkably exemplified in the anomalous affections of young females; and frequently also in those which attend the final disappearance of the menses.

It is to be observed that the limits between the two divisions under which it is proposed to arrange the several materials of prognosis are by no means always precise. It may often be doubtful whether a particular symptom is an essential character of the disease in the abstract, forming part of its diagnosis, or merely an accidental circumstance, influencing our judgment of the event. And it not unfrequently happens as a consequence of this uncertainty, that a symptom which was formerly referred to one of these two heads, is in the progress of pathology found to belong to the other.

I. Of the Prognosis of Disease as deduced from its Diagnosis.

The prognosis of particular diseases will of course be included in the articles allotted to them in the present work. It will be our more appropriate object here to generalize the subject as far as is practicable, by considering diseases as grouped together in natural families. In adopting a classification for this purpose, the point to be chiefly aimed at is its facility of application, and as no pretension is made to a perfect nosological arrangement, it is unnecessary to enter into a defence of that which will be employed in the following pages. It will be sufficient if the reader be advertised of the sense in which words employed to designate the several families of disease are used, and if the same words be always used in the same sense.

In the progress of this attempt to apply pathology to the subject of prognosis, the imperfect state of that science, or at least its limited applicability to questions of a practical nature, will often be apparent. In many diseases, and perhaps even in the majority, it may adequately account for their tendency and ultimate event; but in many others our knowledge of these points is matter of simple experience, admitting as yet neither of useful generalization nor of explication by any known laws of pathological science.

We propose to consider the different families of disease in relation to the following objects of prognosis: 1. their curability; 2. their danger; 3. the particular circumstances which may be expected to arise in their progress; 4. the supervention of new diseases; 5. their duration; 6. their liability to recur.

1. **Curability.**—The question whether a disease is remediable or not is in its nature quite distinct from that of the degree of danger which attends it. It is true that in many affections, as, for example, hydrophobia, the former appears almost solely determined by the latter, so that we have little or no reason for judging a cure to be hopeless further than our experience of the incompatibility of the disease with the preservation of life. Such cases, however, more properly belong to the next head.

Some diseases appear to be absolutely irremediable either by nature or art; in others, on the contrary, a cure may be almost certainly predicted; and between these extremes we meet with every shade of difference.

Many cases of disease which, to speak with pathological accuracy, must be called irremediable, inasmuch as the structure of the affected part cannot be perfectly restored, are yet, in a practical sense, sufficiently curable, because the alteration of structure, though permanent, is productive of no inconvenience. This is well illustrated in inflammations of serous membranes leading to adhesions of moderate extent.

Of the various forms of *idiopathic fever* (using the words in their ordinary acceptation) no one variety can be considered as in its nature incurable, since it is their general character to have a more or less determinate course and duration, and thus to cease spontaneously when they are not destructive of life. Some varieties, as the plague and yellow fever, (and perhaps the present epidemic cholera ought to be classed with them,) must, however, be deemed in a high degree incurable, because in a large proportion of cases they prove fatal, and as such they will be considered under the next head. In others, as the ordinary continued fevers of this climate and intermittents, (when they are not inveterate, and their local cause can be avoided,) general experience justifies a pretty confident expectation of recovery. The prognosis in remittent fevers is generally good in proportion as the remissions are distinct, or as the affection approaches to the character of an intermittent. As to symptomatic fevers (among which

almost all of those which are called hectic, and probably also infantile remittent fever, must be included,) their very designation implies that the question of their curability is contingent upon that of the primary disease to which they owe their origin.

It may be said of *acute inflammations* as of idiopathic fever, that none of them is, *per se*, incurable. In some, however, as for example acute hydrocephalus and laryngitis, the hope of cure is greatly diminished by the danger which attends them. In many others there is a tendency, more or less strong, to results which constitute organic disease, and which are often wholly irremediable. One of the principal of these results of inflammation is the deposition of coagulable lymph or fibrine, constituting what are called false membranes. These are most frequent in the serous membranes, where they generally cause adhesions between the opposing surfaces, and become eventually organized, and often even secreting tissues. In such an advanced state their removal is certainly beyond the reach of art or nature; and even in their earlier stages there is no evidence of absorption ever taking place, while expulsion is of course out of the question. Although adhesions of serous membranes are thus irremediable in a pathological sense, yet in a practical point of view they are ordinarily scarcely to be recognised as constituting disease. In the pleura and pericardium they are not unfrequently found to have been almost universal without having produced any appreciable inconvenience. The same may be said of the adhesions which are artificially produced by stimulant injections for the cure of hydrocele. Owing to the mechanism of the abdominal viscera, adhesions between different portions of the peritoneum appear more often to interfere with their functions, but by no means uniformly so. Inflammation of mucous surfaces exhibits much less tendency to the production of false membranes, and when they do take place, the prognosis is widely different; for by the conjoined operation of muscular contractions and mucous secretion, the membrane when formed is commonly detached and expelled, unless, as is often the case in croup, its presence has speedily caused death. Hence permanent and incurable adhesions are of rare occurrence. According to the views of Laennec, the hepatized state of the lungs consists in effusion of coagulable lymph into the air-cells, and he seems to regard it as removable by the powers of nature in every stage of its progress. It is, however, probable that the consolidation thus produced is often permanent and irremediable. In iritis there is a great tendency to the formation of organized adhesions, for which a surgical operation is the only resource. Those effusions which take place in the cellular and white fibrous tissues in inveterate gout and rheumatism, appear to be almost wholly incurable. The submucous cellular tissue is probably the seat of the thickening which constitutes permanent or organic stricture. When this is recent, mechanical pressure has some power in producing absorption; but more commonly its destruction by caustics, &c. is the only effectual remedy.

Ulceration, when it is the result of acute inflammation and does not destroy life, may be regarded as curable, though probably the integrity of the organization of the part is never perfectly restored. The deficiency is, however, very rarely discoverable, the eye being the principal exception, and that by no means a constant one. Suppuration, another result of acute inflammation, occurs in two forms. In the one it is merely an altered secretion from the surface inflamed, and unless it take place to such an extent as to be destructive of life, admits of cure. In the other it assumes the form of abscess, and, when not fatal, is remediable in various ways, as by absorption, by ulceration and the evacuation of its contents, or by the aid of surgery. Among the occasional effects of acute inflammation, softening and gangrene may be included. The former, which is principally met with in the cerebral tissue and mucous membrane of the alimentary canal, appears to consist in a disorganization wholly or in great measure irremediable. In gangrene reparation is utterly hopeless; although, when life is preserved, nature sometimes effects what may be called a cure by the separation of the diseased part. It is possible that some other alterations in the condition of parts occasionally result from acute inflammation. They will, however, be more conveniently considered under the general head of organic changes and lesions of structure.

Inflammation seems in general to be more intractable when it attacks parts of low organization, as bone, cartilage, white fibrous tissue, and consequently joints. Chronic inflammation is also commonly less under the control of remedies than acute, and more peculiarly so when, as is often the case, it is connected with a cachectic habit of body, as in scrofula, syphilis, mercurial erethism, &c. It is probably owing in part at least to the scrofulous habit with which acute hydrocephalus is so commonly connected, that every mode of treatment is found ineffectual in a considerable number of cases.

Under the term *profluvia* may be comprehended all those cases of mucous or muco-purulent discharge which cannot properly be referred to inflammation. It will thus include many forms of bronchial catarrh, diarrhœa, and perhaps dysentery, catarrhus vesicæ, and leucorrhœa. None of these is in itself incurable, but every one of them may be and often is so, from being symptomatic of some organic disease, and even when idiopathic they are often very unmanageable.

Hemorrhages, if not so profuse as to be fatal, may be considered as remediable, except when they are symptomatic of organic disease, as hæmoptysis attending tuberculous phthisis, and hæmatemesis and melæna when referable to disease of the liver or other abdominal viscera. In those forms of hemorrhage in which the effused blood finds a ready exit, the integrity of the part is left untouched; but when the effusion occurs in the substance of an organ, the case is widely different. Not only does a coagulum remain, but its presence is necessarily accompanied with a dilaceration or compression of the substance of the organ; and though the coagulum is often ultimately removed by absorption, the structure of the organ may be irreparably injured. Here, however, as in regard to the organic results of inflammation already adverted to, we must bear in mind that

what is pathologically incurable may be unattended with any appreciable morbid effects. Thus, in the cases of cerebral hemorrhage occurring in hemiplegiac attacks, every symptom of inconvenience sometimes disappears, not only before cicatrization of the breach has been effected, but even before the coagulum is absorbed. On the other hand, cases are not wanting in which the palsy has been permanent, though absorption and cicatrization had taken place. Pulmonary apoplexy, which Laennec refers to effusion into the air-cells, is considered by that pathologist to admit of perfect restoration of the healthy condition of the organ. The hematemesis of young females, and other hemorrhages which appear to be vicarious of the menstrual discharge, are striking examples of a favourable prognosis being justified under circumstances apparently the most alarming. The hemorrhagic disposition in scurvy being peculiar in its cause, is no less so in its prognosis, which wholly depends upon the power of changing the diet and other circumstances to which the disease owes its origin.

The peculiarly intractable character of most of the forms of *dropsy* is well known. Though this is chiefly, it is by no means wholly to be explained by the dropsy being merely symptomatic of some organic disease; for chronic hydrocephalus and ascites are often, and hydrocele is almost always, idiopathic, yet they are commonly but little influenced by medical treatment. Anasarca and hydrothorax are much more manageable, and even when symptomatic of organic disease, may often be removed for a time by the use of diuretic and other remedies. The powers of medicine in hydropericardium and œdema pulmonum are not much known, principally because the diagnosis of those affections is very obscure. Many forms of dropsy admit of temporary relief by surgical means; hydrocele alone (or almost so) of a permanent cure, namely, by the artificial excitement of inflammation in the serous membrane, which leads to universal adhesion of its opposing surfaces. Ovarian disease can hardly in strictness be recognised as a form of dropsy, and if it be, it is very far from affording an exception to the general intractable character of the family.

Under the designation of *cachexiæ* it will be convenient for our present purpose to include several diseases which have little in common except the impossibility of assigning them a local seat. Some of them are very little amenable to treatment. This is almost proverbially the case with scrofula in its various forms, among which may be included tuberculous disease generally. Lues and mercurial disease, when inveterate, are very difficult of cure; and diabetes, which may properly be noticed here, is well known to offer an almost hopeless prognosis. In chlorosis, on the contrary, and in scurvy, (when the circumstances which engender and maintain the disease can be reversed,) the prospect of recovery is generally good.

Under the head of *organic disease, lesions, and other changes of structure*, may be comprehended all those deviations from the natural organization of parts which are not distinctly referable to inflammation, or at least not commonly so. As a whole, they are very little remediable, though in the following enumeration many exceptions will be noticed. In hypertrophy and atrophy the prognosis varies greatly with the tissue affected; thus, by the judicious employment of remedial means, great changes may be effected in the bulk of the adipose tissue, and possibly of the muscles of locomotion; whereas in the hollow muscles, as the heart and urinary bladder, which present the two most common and well-marked instances of hypertrophy, such means seem to avail little or nothing. The contrast of the two cases perhaps countenances the opinion of some pathologists, that hypertrophy of the heart is essentially different from that increased bulk of voluntary muscles which results from their increased use.

The development of the natural tissues of the body in parts into the healthy structure of which they do not enter, is an occurrence which rarely if ever admits of remedy. Such are ossifications (with which may be conjoined exostosis and anchylosis) and cartilaginous degeneration. The fatty degeneration of the heart and liver may perhaps be included with them.

New formations are either organic or inorganic. According to most pathologists, tubercles are to be enumerated among the latter. Though the absorption of these bodies is generally admitted to be impossible, there is a mode in which nature has provided for their removal, namely, by the process of softening, or, as it is often called, ulceration; and from recent investigations it appears that the cavities which are thus produced in the lungs are occasionally obliterated by a kind of cicatrization. Of course this, in a pathological sense, is a very imperfect mode of cure, since there is no restoration of the pulmonary substance; and not only is it both rare and imperfect, but owing to the continued deposition of tuberculous matter in other parts of the lungs, it is commonly in the end unavailing.

The occasional expectoration of tubercles is far too rare and partial to modify the general prognosis of the affection. Other varieties of inorganic formations are melanosis, the contents of encysted tumours, gouty concretions, and urinary and bilious calculi. The first is in no way remediable; the others are occasionally got rid of by expulsion or ulceration, but more often not without the aid of surgery. In the opinion of Andral, medullary sarcoma is an inorganic deposition, not a degeneration: it appears to be wholly beyond the reach of remedies.

The organized new formations, as sarcomatous tumours, polypi, and hydatids, though occasionally removed by spontaneous ulceration, are in general wholly inaccessible to remedies, if we except those which surgery provides. Perhaps ovarian disease may properly be placed here. As has been already observed, it is unaffected by medicine; tapping affords but a very temporary relief; and excision is scarcely practicable except in that early stage of the disease in which it occasions far too little inconvenience to dispose the patient to submit to a formidable operation.

The organic diseases which seem to consist rather in a change or degeneration of the natural structure of the part than in any new formation, such as scirrho-carcinoma and some visceral indurations, softening of the brain and spinal cord,

mollities ossium, cataract, &c. do not admit of cure unless by surgical operations; and even then the prognosis is often bad, as in scirrho-carcinoma, and still more in medullary sarcoma, (regarded by some pathologists as a degeneration,) because the disease, though extirpated from one part, may already exist, or is liable to make its appearance in another, implying not a merely local malady, but a morbid state or tendency of the system. Indurations of the liver and spleen, occurring in inveterate ague, appear to be very little under the influence of remedies. If bronchocele and sarcocele properly belong to this division, they afford well-known exceptions to the ordinary incurability of this class of organic diseases.

Dilatations of the hollow muscles and canals, when produced by mere distension, are generally curable (supposing the cause removed) in an inverse proportion to their duration, as is seen in the urinary bladder and passages, and in the colon. Even where the dilatation is rather the effect of want of tone or contractile energy the case does not seem to be hopeless; at least Piorry alleges that he has watched the gradual diminution of dilatation of the cavities of the heart; and we know that varicose veins are sometimes reduced in size by the effects of pressure. There is reason to believe that a tympanitic state of the stomach and intestines is sometimes caused by mere want of tone, and admits of cure by proper treatment. The pathology of ileus is imperfectly known; but if, as Dr. Abercrombie inclines to infer from his researches, the only essential circumstance is a dilatation of some portion of the intestinal canal, it may properly be noticed here. The danger that attends this severe affection is well known to be great. but it cannot be regarded as incurable. Dilatation of the bronchi and enlargement of the air-cells (the pulmonary emphysema of Laennec,) are, as far as is known, incurable. Aneurism rarely consists in mere arterial dilatation: such, however, appears to be occasionally the case, especially in the aorta; and it is more particularly in this form of the disease that, in the estimation of some writers, the mode of treatment proposed by Valsalva produces a beneficial result.

Permanent strictures of canals, from effusion of lymph, have been already noticed among the effects of inflammation: those which depend on muscular contraction only are in a considerable degree remediable by mechanical means. Of permanent contractions of the hollow viscera we know little.

Breaches in the solids.—The reunion of fractured bone is generally practicable, unless in some particular states of the constitution, as pregnancy, lues, and scurvy. The only alleged ordinary exception is the neck of the thigh bone. Lacerated white fibrous tissue, as ligaments and tendons, also readily reunites. The reunion of torn muscles appears to be effected by cellular tissue, not by the reproduction of muscular fibre. It is probable that the hollow muscles and muscular canals would be generally repaired in the same manner, were not their rupture mostly attended by fatal consequences; and the same may be said of the solid viscera, as the liver, &c. In the case of blood-vessels being torn or cut through, a peculiar provision is made for the repair of the injury. The separated ends are not reunited, but the circulation is carried on through collateral branches. Divided nerves are said to be reunited by nervous tissue. Excretory ducts, the pulmonary cells, and the cutaneous and cellular tissues are all susceptible of reunion.

Ulcerations generally admit of repair by the processes of granulation and cicatrization; but least so when the system is under the influence of any of the affections already mentioned as cachectic, especially scrofula and syphilis. Of the peculiarly intractable character of ulcers in the former of these, we have instances in the articular cartilages, and in laryngeal and tracheal phthisis. With regard to excavations formed by the removal of morbid depositions, we know that healthy abscesses, when emptied, readily heal, and that even the less manageable ones are to a considerable extent curable. It has been already stated, that when life is preserved for a sufficient time, the powers of nature are occasionally adequate to the reparation of the tuberculous excavations of the lungs, and hemorrhagic cells in the brain. In some of the congenital breaches, as the hare-lip and imperfect palate, a cure may be effected by operation. In spina bifida, all attempts to cure or even palliate the affection have commonly failed; and in the case of unnatural communication between the cavities of the heart, no means can possibly be of avail.

Displacements.—The prognosis in dislocations of the joints is mostly good, provided the attempt at reduction be not too long delayed. Though the lateral curvature of the spine is often, at least in its origin, merely a displacement of certain portions of the column, it is far from being uniformly a curable affection. The angular curvature rather belongs to the head of diseased structure than to that of displacements. When invagination of the bowels is from above downwards, and no adhesions have been formed, there is good reason to believe that replacement is often spontaneously effected: when, however, adhesions have taken place, the cure must be all but hopeless. The prognosis appears to be also very bad in every circumstance of that rare form of intussusception which is from below upwards. External herniæ, when not strangulated, are mostly replaceable either spontaneously or by taxis; and when strangulated, often admit of cure by the division of the stricture. Even in cases which from adhesions or other causes cannot be relieved in this way, a sort of cure is occasionally effected, either spontaneously or designedly, by the formation of what is called an artificial anus. Diaphragmatic and other internal herniæ are wholly inaccessible to the resources of art. Prolapsus of the uterus and anus, when not invetcrate or of great extent, generally admits of cure or relief, either by means directed to increase the tone of the parts, or by mechanical support. In the latter affection, when both these means fail, excision of the protruded portion is often resorted to with success. Retroversion of the uterus is almost peculiar to the impregnated state of the organ, its immediate cause being generally distension of the urinary bladder; and when this is removed, the womb readily recovers its proper position, either spontane-

ously or by manual assistance. Inversion is perhaps never relieved except by the latter means.

When fluids escape from their natural seats by ulceration or disruption, the prognosis is very various, depending on particular circumstances. That of air into the cellular tissue, constituting external emphysema, generally ends favourably, either by spontaneous absorption or by the aid of punctures. Pneumothorax and abdominal tympanitis are much less curable, being almost always the result of organic lesions. The same may be said of effusions of urine, in which, however, remarkable instances of the curative resources of nature, when aided by the prompt and judicious interference of surgical art, are occasionally met with.

Under the general designation of *functional disorders* may be included all those which are not constantly and necessarily associated with visible changes in the condition or organization of parts. Hence, while in most of the preceding classes of disease, pathology throws more or less light upon the question of curability, in the present it almost wholly fails us. Indeed in many of the most intractable and fatal cases of these affections no morbid appearance whatever can be found after death, or at least nothing beyond slight changes in the vascularity of the part whose functions had been disturbed, and which are considered by the best pathologists rather as effects than causes of the disorder. It is true that the functional disturbance is sometimes associated with, and apparently dependent upon, inflammatory or organic disease; and where the existence of this can be known, it must of course materially influence the prognosis.

In reviewing these disorders, it will be most convenient to arrange them according to the organs or functions most prominently disturbed; and so widely do they differ in regard to their prognosis, and so insusceptible are they of any satisfactory generalization, that it will be necessary to speak of most of them individually.

Functional affections of the nervous system, including disorders of sensation and of the muscles of voluntary motion.—Two of these, viz. tetanus and hydrophobia, the pathology of which is extremely obscure, are so fatal, that in the former a cure is comparatively rare, and in the latter almost unknown. The convulsions of infants, though much less commonly fatal than the preceding, are a source of great mortality in the first years of life. In those of puerperal women there is generally a tolerably good prognosis, except where they have been produced by very profuse hemorrhage. Apoplexy is another affection often incurable by reason of its immediate fatality; and even when it does not destroy life, but disappears either spontaneously or by the use of remedies, the ultimate prognosis is greatly influenced by its known tendency to recur. Palsy and insanity, though not of themselves very frequently mortal, are often wholly incurable, and commonly but little under the influence of remedies. Palsy, at least in two of its forms, viz., hemiplegia and paraplegia, is more often connected with visible or organic changes than any other affection of this class. Yet even were the existence of such changes more certainly ascertainable than it can be, it would be necessary to use great caution in drawing inferences as to the prognosis. Thus we have the testimony of Dr. Abercrombie, that in cases of hemiplegia, the effused blood may be absorbed and even cicatrization effected, and yet the paralysis occasionally remain; while in other cases the paralysis may disappear before absorption has taken place. While so much obscurity hangs over the pathology of these affections, it need not surprise us that remarkable and unlooked-for instances of recovery, even from inveterate palsy, sometimes occur; and hence we properly draw the distinction between a bad and a hopeless prognosis. If aphonia be considered as a form of paralysis, it affords a striking instance of the uncertainty of prognosis in such affections; since, on the one hand, our anticipations of success from the use of remedies should be any thing but sanguine, while, on the other, we know that sudden and complete recovery not unfrequently takes place even when the affection has existed for years.

The prognosis in epilepsy is on the whole bad, the malady often resisting every mode of treatment, even in cases in which after death no pathological cause can be detected. On the other hand, hysteria, which sometimes very nearly resembles it, is generally curable; as in fact are most diseases which depend upon a disordered state of the menstrual function. Catalepsy is probably but a modification of hysteria, and like it generally admits of recovery; as also does chorea. Delirium tremens too often ends fatally to allow in general of a very sanguine prognosis. Hypochondriasis, which seems to be intermediate between dyspepsia and insanity, partaking in some measure of the characters of both, is probably on the whole less curable than the former, and more so than the latter.

With regard to morbid sensations, pain, though commonly but a symptom of other affections, constitutes of itself the whole character of one family of diseases, the neuralgiæ. Like the functional disorders just spoken of, they are sometimes connected with organic or other appreciable disease of some part of the nervous system, but more often not, even when they are found utterly incurable. The neuralgiæ, though often irremediable by any mode of treatment, do not on the whole justify a very unfavourable prognosis. It must, however, be much influenced by the particular seat of the pain. Thus the tic douloureux, many forms of head and back-ach, gastrodynia, and angina pectoris, are in general far less remediable affections than pleurodynia, sciatica, and lumbago. With regard to the pains of the chest, chiefly occurring in females, and referred to the intercostal nerves, the pathology is obscure, but the prognosis generally good.

With regard to functional affections of the thoracic organs, the cases ordinarily designated spasmodic croup most commonly end favourably. Some authors, however, deny the existence of the disease. Spasmodic asthma, even when apparently independent of organic disease, is confessedly a very intractable affection, the prospect of a perfect cure being on the whole but faint. The same may be said of palpitation and angina pectoris, even in the absence of organic disease; and when, as is often the case, they are associated

with it, there can be little or no hope of recovery.

Of the various modifications of functional disorder of some one or more of the digestive organs, there is none which can be regarded as in its nature incurable, though many, perhaps most of them, are often very obstinate.

The ischuria renalis, though but a functional disorder, is so often fatal that the prognosis is far from good. An exception must, however, be made as to those cases in which it is a symptom of hysteric affection. Two other morbid conditions of the renal function, namely, the secretion of albuminous urine, and the phosphatic diathesis, are perhaps mostly connected with organic disease; at any rate they are commonly very incurable maladies. Diabetes has been already noticed as being rather a constitutional disease than a mere local affection of the urinary organs.

In amenorrhœa, when it is not symptomatic of some other disease, the ultimate prognosis is generally good, though the affection is often very tedious and unmanageable. Dysmenorrhœa is perhaps even more so.

Congestions.—Although either a general or partial derangement of the balance of circulation between the arterial and venous systems may mostly form one link in the chain of circumstances which constitute diseases, it is very doubtful whether any one which is recognised in nosology can be said essentially to consist in such a state. If, however, it be otherwise, we may safely assume with respect to prognosis, that though the derangement may be sometimes destructive of life, or may eventually lead to irremediable changes of organization, it cannot constitute a disease in its nature incurable.

Parasitic animals are chiefly intestinal worms and hydatids: the former are mostly accessible to the powers of medicine; but the latter, being rarely in open canals, cannot be expelled by such means; so that the question of curability very much resolves itself into that of the practicability of a surgical operation.

2. Danger to Life.—A large number of diseases are in themselves neither so entirely destitute of danger as to cause no alarm, nor so generally fatal as to excite it in a very high degree. The estimate of danger in these affections must therefore depend on the particular circumstances of each individual case, a subject which forms the second part of the present article. There are, however, other diseases which occupy the two extremes of the scale, some being very commonly fatal, and others as commonly devoid of danger. It properly belongs to a general view of the subject of prognosis to attempt an analysis of the circumstances which determine the location of a disease in either of these two extreme classes. As we have already seen that the light which pathology throws upon the question of curability is frequently very imperfect, so will that science be often found an inadequate guide to the discovery of the extent of danger. It may be premised as a general position, that the ultimate issue of disease, whether in death or recovery, can be less certainly foreseen in acute than in chronic affections.

A Diseases, invariably or very commonly fatal, may be thus classified in relation to the circumstances which seem to determine the danger.

a. Those in which the whole system receives a sudden and overwhelming shock, most apparent in the disturbed balance of the circulation, and commonly attended with a morbid state of the circulating fluids. In this way certain forms of epidemic fever, especially the plague and yellow fever, (and the spasmodic cholera ought probably to be included,) are very often fatal in their first, or, in the language of Dr. Armstrong, their congestive stage; and sometimes even before the manifestation of any local or characteristic symptoms. It is apparently in an analogous way (though the nervous system is then often more prominently affected than the vascular) that life is sometimes suddenly extinguished by violent accidents or the agency of certain poisons.

b. Those in which organs of great importance to life, or having very extensive sympathies, are affected with inflammation or other considerable disease. Thus encephalic inflammation generally, and especially acute hydrocephalus, apoplexy, carditis, pericarditis, and organic disease of the heart, extensive phlebitis, croup, laryngitis, asphyxia, peripneumonia, peripneumonia notha, and severe or extensive disease of the gastro-intestinal mucous membrane, may all be regarded as dangerous affections. In many of them, and perhaps more particularly in those which are seated in the encephalon, even if we were always able during life to ascertain the extent and degree of the local disease or disorganization, we should have a very uncertain guide for the prognosis of danger, since the researches of pathology show that these bear no definite relation to the fatal tendency. The amount of functional disturbance probably affords a better criterion. The cases of cerebral abscess related by O'Halloran strkingly exemplify the occasional retention of life when disorganization of an important organ has proceeded to a very great extent.

c. The tendency to a fatal event seems in some diseases to be rather owing to the kind of morbid change or to its extent, than to the importance of the organ affected. Of the first kind of cause we have examples in strangulated hernia, in gangrene generally, in cynanche maligna, and perhaps in ileus; of the second, in fevers when fatal after reaction, in confluent small-pox, diffuse inflammation of the cellular tissue, and extensive peritonitis.

d. Diseases which are fatal by gradual exhaustion, including the greater part of mortal chronic diseases, as phthisis pulmonalis, laryngeal and tracheal phthisis, chronic bronchitis, empyema, tabes mesenterica, psoas abscess, some organic diseases of the liver, scirrho-carcinoma, medullary sarcoma, peritoneal accretions, ovarian disease, diabetes, &c. It is to be observed, however, that few chronic diseases terminate fatally without the supervention of disease in the bronchial or gastro-intestinal mucous membrane, especially the latter; and such a complication must undoubtedly have an important influence in determining the fatal event, and also affords a ground for predicting its approach. Profuse hemorrhages may be classed among diseases which are fatal by exhaustion

The most common examples are, the rupture of aneurisms, wounds of arteries, and puerperal hemorrhage. In some forms of apoplexy internal hemorrhage seems to be, in part at least, the immediate cause of death.

e. Intense pain, though not often of itself fatal, seems to be occasionally so. Gastrodynia perhaps affords the most frequent and decisive examples.

f. In some affections the prediction of death is rather founded upon the high probability that another and fatal disease will supervene than upon the danger which immediately arises from the existing one. The termination of ischuria renalis in apoplexy or coma is perhaps the most considerable instance.

g. The fatal tendency of puerperal peritonitis seems to be much more explicable by the peculiar condition of the system at large immediately after parturition, than by the seat or intensity of the local affection.

h. There are two diseases, namely, hydrophobia and tetanus, in a very high degree dangerous to life, yet so obscure in their pathology that it seems impracticable to unite them with any other class of mortal diseases.

B. Diseases which in themselves are rarely fatal may be thus classified:—

a. Those in which, although there be general disturbance of the nervous and circulating systems, it is moderate, and unattended by any considerable local affection, such as the ordinary intermittent and continued fevers of this country.

b. Inflammations of parts not essential to life, or not having extensive sympathies with other parts of the body; such as those of the eye, tonsils, parotids, mammæ, testicles, prostate, urethra, vagina, joints (including articular rheumatism and gout), lymphatic glands, and cellular tissue.

c. Organic affections of similar parts, as cataract and many other affections of the eye, bronchocele, hydrocele, sarcomatous and encysted tumours, and hydatids. The principal exceptions are when these affections are such as are considered specific, as scirrho-carcinoma and medullary sarcoma.

d. Certain functional disorders, as epilepsy, catalepsy, chorea, hysteria, insanity, hypochondriasis, the neuralgiæ in general, spasmodic asthma, nervous palpitation, dyspepsia, amenorrhœa, and most of those disorders which are connected with it, as chlorosis and vicarious hemorrhages. Nowhere is the imperfection of pathology, as a guide to prognosis, more apparent than in relation to this class of affections; for example, it is by experience only, and an experience which does not admit of generalization, that we judge of the wide difference in respect of danger between epilepsy, hysteria, and syncope on the one hand, and hydrophobia and tetanus on the other.

3. **Circumstances which may be expected to arise in the course of a disease.** — Although a distinction may properly be made between the appearance of new symptoms during the progress of a disease, and the supervention of new diseases, it must necessarily often be arbitrary, and sometimes obscure; since it wholly depends upon the fact of such symptoms or circumstances being or not being recognised by nosologists as separate diseases. Those which are not generally admitted as such may be arranged under three heads, *critical*, *non-critical*, and *intermediate*, that is, such as are critical in a lower degree, denoting merely a temporary alleviation of the malady.

Critical.—It is to be premised that, though a particular circumstance may in one disease be critical, it may in another, or even in a different stage of the same, be non-critical. Thus profluvia, hemorrhages, and tumours, which towards the termination of fevers are often critical, are mostly not at all so in the earlier periods of their progress. Whether critical circumstances be the cause, sign, or effect of the termination of the malady, is a question of little moment in relation to prognosis, though it may be one of much interest with regard to practice.

In treating of critical circumstances, we find a distinction of much practical importance, namely, as they indicate the permanent removal, or merely the temporary disappearance of a disease. The former are chiefly seen in continued fever and acute inflammations. Why, in such affections, one symptom or circumstance is critical rather than another, is a question involved in much obscurity. What has been called the constitution of the season appears to have considerable influence. Thus in some epidemics, fevers most commonly terminate by sweating; in others, by purging; though perhaps the most frequent mode is by copious urinary deposits. In other cases the crisis is marked by hemorrhages, abscesses, buboes, or carbuncles. There seems in fact little beyond mere experience of the prevailing tendency, to guide us in the anticipation of the particular circumstance which is likely to mark the solution. The constitutional predisposition of the individual has, however, probably some share; and also the characters of the disease, in regard to the organs or functions which are most prominently disturbed. It might indeed be conjectured that when the function of an organ has been interrupted by disease, it would, at the cessation of that disease, be renewed with augmented energy. And perhaps, as a general position, this has some foundation in truth. It seems to be in degree illustrated in the spasmodic cholera, in which affection, while the force of the disease falls very much upon the organs concerned in digestion, healthy bilious secretion often marks its favourable termination. The position must, however, be received with considerable limitation. Thus, as Laennec states, peripneumonia much more often terminates with urinary deposits than with copious sputa.

In those affections which are characterized by accessions or paroxysms returning at intervals, the termination of the paroxysm is very commonly marked by some critical circumstance. Such is the sweating of ague, the expectoration in some forms of asthma, vomiting in pyrosis, perhaps the swelling of the foot in regular gout, sleep in epilepsy, and the secretion of lithic acid in some of those painful affections of the loins which are too indiscriminately called fits of stone or gravel, there being often no evidence whatever of the passage of such concretions.

Intermediate.—In many diseases we can predict,

with more or less certainty, the occurrence of circumstances which, though they by no means denote the cessation of the malady, commonly imply a certain measure of relief. Such are dropsical effusions and hemorrhages in organic diseases and chronic inflammations of important organs, as the brain, heart, lungs, and liver. It is true that such an occurrence may itself constitute a more troublesome or immediately dangerous disease than the primary one which it tends to alleviate; and perhaps this is more particularly the case in regard to the brain, owing to the mechanism of the cranium. But even there we have strong reasons for supposing that hemorrhage occasionally, and serious effusion more often, serve to mitigate existing diseases. Effusion into the joints and neighbouring tissues, in gout and articular rheumatism, is also generally attended with some alleviation of suffering. In hectic and in remittent fevers, sweating, urinary deposits, and other secretions, make an imperfect solution; and this is observable, though in a less degree, in the daily history of even continued fevers.

Non-critical.—Under this designation may be comprehended all those circumstances, whether they be pathological changes or functional derangements, which make up the history of a disease, and which consequently may be predicted when that history is known. It is evident that prognosis of this kind is chiefly available in those affections which have a more or less determinate course and regular succession of events, the occurrence of which may be foreseen from the commencement. Such is the series of events which constitute a fit of ague, and the succession of symptoms in acute exanthemata, gout, syphilis, yellow fever, and epidemic diseases in general. The following may be instanced as some of the more considerable examples of non-critical circumstances whose occurrence may be predicted in certain kinds of disease.

a. In fevers and febrile affections generally, daily exacerbations and remissions in the symptoms may be looked for, commonly more or less nearly corresponding with the hours of sunset and sunrise. These are most conspicuous in the fevers called remittent, (as indeed their designation implies,) including infantile remittent fever, and in hectic fever, in which latter some authors distinguish two daily exacerbations, namely, about noon and sunset. Among acute inflammations, rheumatism and gout present these daily variations most conspicuously. In many cases of neuralgic affections and chronic rheumatism, the daily accessions occur at very different hours from those above named, governed by circumstances which are wholly unknown, and as to which it is impossible to generalize.

b. In inflammations, certain pathological results, varying with the tissue or organ affected, may be more or less confidently predicted. Thus inflammation of the mucous membranes, the skin, and cornea, is most liable to pass into ulceration; that of the former also often leads to softening, and occasionally, as in croup and diphtheritis, to effusion of coagulable lymph, or false membrane. Serous effusion, and the formation of false membrane resulting in adhesions, are the most common effects of inflammation of serous membranes. Erysipelatous inflammation frequently tends to gangrene; so also, in the opinion of Dr. Abercrombie, does inflammation of the muscular tissue, as in the enteritis of Cullen, and in ileus. Inflammation of the cellular tissue, kidneys, tonsils, mammæ, and, in India, that of the liver, ends chiefly in suppuration and abscess. In gout and rheumatism there is a tendency to those effusions into the white fibrous tissue which cause stiff joints, and in gonorrhœa, to the thickening which produces stricture. The pathology of phlegmasia dolens is yet involved in much obscurity; but as a point of prognosis, it deserves notice that its appearance may be often foreseen when much pain is felt in the groin soon after parturition.

c. Certain organic affections have a pathological course peculiar to themselves. Thus tubercles pass through the process of softening; scirrhus goes on to carcinoma; medullary sarcoma to hemorrhage; and ulceration of the articular cartilages to abscess and sinuses in the surrounding parts.

d. In diseases which cause long confinement to bed, and are attended with much emaciation and general loss of vital power, the occurrence of bad sores is to be apprehended. Hence they often appear in protracted fevers, phthisis pulmonalis, inveterate lues, the worst cases of insanity, &c. Somewhat analogous to this is the tendency of punctures in anasarcous limbs to cause gangrene.

e. Perhaps in most fatal chronic diseases, and certainly in phthisis pulmonalis, the appearance of slight delirium may be expected to precede death.

f. Lastly, some individual diseases are liable to circumstances peculiar to themselves, and not admitting of being generalized. Thus the disappearance of cynanche parotidœa is very commonly attended by swelling of the testes or mammæ; and inveterate ague produces indurations of the liver and spleen.

4. **Supervention of new Diseases.**—There are many varieties as to the mode in which this occurs. Thus the disappearance of the primary affection, and the development of a secondary one may be simultaneous; and if the nature of both diseases be the same, the substitution of one for the other is called metastasis or translation. Again, there may be an interval between the cessation of the first affection and the appearance of the second, as is sometimes observed when phthisis pulmonalis follows measles. Or, lastly, the two may coexist. It is to be observed, that although some diseases always supervene in the same way, this is by no means the case with all: thus disease of the heart and pericardium may either replace articular rheumatism or coexist with it. It may perhaps be assumed as a general position, subject, however, to exceptions, that when the primary disease is acute, the supervening one commonly supplants it; but when it is chronic, they go on together.

The circumstances under which new diseases supervene upon previously existing ones may be thus generalized:

a. A great degree of vascular disturbance of the system at large is very prone to end in local inflammation, its particular seat being apparently in great measure determined by the predisposition of

the part. Thus local inflammations very often occur in the course of fevers and acute exanthemata; and hysteritis or peritonitis follows profuse puerperal hemorrhage. Perhaps the frequent appearance of encephalic inflammation after violent concussion may be referred to the same head.

b. It has been already observed that chronic diseases of important organs, as the lungs, heart, brain and its membranes, liver, and mesentery, very commonly lead to disease of the gastro-intestinal and bronchial mucous membranes.

c. Diseases attended with great exhaustion, as protracted fevers, phthisis pulmonalis, diabetes, diarrhœa, and hemorrhages, generally induce anasarca. In organic diseases of important viscera, not only does dropsy take place in the cellular tissue, but also often in the cavities; and as a general though not universal rule, more especially in those with which the diseased viscera are more particularly connected. Thus hydrothorax and hydropericardium are found to supervene upon diseases of the heart and lungs; ascites upon those of the liver and abdominal viscera generally; while most organic affections of the encephalon sooner or later cause serous effusion into the ventricles, or between the membranes.

d. Many cases of supervening disease seem referable to the relation or sympathy which subsists between different tissues of the same organ, and between the external and internal parts of the same region of the body. Some of these cases are strictly metastatic; in others, the primary and secondary diseases coexist. We have examples in inflammation of the brain and its membranes ensuing upon erysipelas of the face and scalp, upon injuries of the latter, and upon otorrhœa and ophthalmia; in pleurisy occurring in peripneumony and phthisis; in the alternation of abdominal dropsy with diarrhœa or dysentery; perhaps also in anasarca following scarlatina, though in other exanthematous affections little or no tendency of this kind is observed.

e. Continuity of tissue, together with close alliance in function, is a cause of secondary diseases, most conspicuously seen in the mucous membranes. Thus, stricture of the urethra and disease of the prostate are apt to lead to disease of the bladder; and the latter, including vesical calculi, to disease of the kidneys. Common catarrh is often followed by an analogous affection of the rectum and urinary bladder, and by an herpetic affection of the upper lip; the diphtheritis of Bretonneau is very prone to pass into croup; and cynanche maligna, and occasionally pertussis, into bronchitis. An American anatomist states that he has traced the continuity of the white fibrous tissue of the limbs with that which enters into the structure of the pericardium, and thence deduces an explanation of pericarditis supervening upon rheumatism. A more simple and natural explanation appears to be that rheumatism is a disease which attacks muscles and fasciæ generally, and therefore, among the rest, occasionally affects the heart and pericardium.

f. The supervention of a new disease seems sometimes to arise from a peculiar sympathy or relation between parts which are neither contiguous, nor immediately connected in function. We have examples in the chylopoietic viscera and encephalon: thus encephalic inflammation not unfrequently ensues upon hepatitis; while the latter is sometimes produced by injuries of the head. So in fevers, meningeal inflammation is found to follow that of the gastro-intestinal mucous membrane, or the reverse. Again, infantile remittent fever is often the precursor of acute hydrocephalus.

g. When a constitutional predisposition or diathesis, such as the scrofulous or tuberculous, subsists, various diseases will either call it into activity for the first time, or, if it had previously been developed in an organ in a latent and unsuspected state, make its presence manifest. This latter is perhaps often the case in regard to the apparently exciting causes of phthisis pulmonalis. Thus all diseases which occasion great prostration of strength, as protracted fevers, exanthemata, diarrhœa, diabetes, and chlorosis, are apt, in the predisposed, to lead to tuberculous disease or external scrofula. So also inflammations or other diseases of the organs most liable to these affections will often call them forth; thus pneumonic inflammation, bronchial catarrh, and sometimes pleurisy, will pass on to phthisis pulmonalis; and inflammation of the mucous membrane of the small intestines into tabes mesenterica. Perhaps the frequent termination of spasmodic asthma in phthisis may be properly classed with the preceding facts. If the constitutional diathesis be already manifested in one organ or tissue, there will be much reason to suspect its present latent existence, and future development in others. Thus external scrofula is often the precursor of phthisis pulmonalis and tabes mesenterica; acute hydrocephalus has been observed to supersede threatened consumption; and Dr. Baron states that accretions may be expected to take place in the pleura, when they already occupy the peritoneum. So, also, the extirpation of medullary sarcoma in one organ is commonly unavailing, owing to its existence or development in others.

h. The disappearance of a morbid action or secretion of a part, or the absence of its accustomed return, is very often followed by disease in some other parts; more especially if the constitution had been long habituated to the preceding affection, or if that affection had suddenly disappeared. Cases of this kind constitute a numerous family, apparently very capricious in their individual characters, and little susceptible of useful generalization. Thus the disappearance of cutaneous diseases, profluvia, hemorrhages, purulent discharges, &c. may give rise to internal diseases of all kinds and localities, the particular nature and seat being of course very much influenced by the patient's age, habits, &c. as is illustrated by the well-known liability of aged persons, under such circumstances, to apoplexy and palsy. The following cases may be enumerated as of most frequent occurrence, and consequently of most practical importance in regard to prognosis: — the various forms of irregular gout, which (whatever be our view of the pathology of the disease) may be fairly considered to be caused by the absence or premature recession of the disorder from the extremities; hysteria and vicarious hemorrhages, resulting from amenorrhœa; the various diseases to which women are subject when they cease to menstruate, of

which scirrho-carcinoma is the most important, if not the most frequent; apoplexy and palsy, following the suppression of hemorrhoids in the aged; the alternation of gout and gravel; the occurrence of hernia humoralis, when gonorrhœa is hastily stopped by astringents; the termination of ischuria renalis in fatal coma; and the occurrence of some general and fatal disease after extirpation of a merely local one, as scirrho-carcinoma of the breast.

i. The obstruction of excretory ducts by the impaction of concrete matter frequently gives rise to disease. Thus jaundice is often caused by biliary calculi lodging in the ductus communis; and it occasionally happens that both the ureters are obstructed by calculi so as to induce ischuria renalis.

k. It is more particularly in regard to the brain and nervous system that we meet with instances of one functional disorder passing into another; though, as is often the case, both may be independent of any vascular or organic change. Thus epilepsy and chorea occasionally lead to fatuity, and mania to complete amentia.

l. There is a question of much practical interest in regard to prognosis which is entitled to some notice in this place; namely, whether there is a general tendency in functional disorders to pass into inflammation or organic disease. Notwithstanding the statements of Dr. Wilson Philip, the general experience of physicians seems to furnish a negative answer to this question, as it respects the most common of all functional disorders, — those of the digestive organs: and the same may be said of palpitations of the heart. In some of the functional disorders of the brain and nervous system, especially mania and epilepsy, pathologists have however, in a large proportion of cases, noted appearances of vascular derangement, and in many, even of disorganization; as especially Wenzels, in regard to epilepsy. Unnatural vascularity of the spinal cord is also said to be commonly found in fatal cases of tetanus and hydrophobia, and even in those of spasmodic cholera; but it is very doubtful whether it constitutes any important part of the pathology of these affections. Perhaps the same may be said of the morbid vascularity generally found in the kidneys in fatal cases of diabetes.

5. **Duration of Disease.** — The distinction between acute and chronic diseases of itself implies some sort of prognosis of their duration, yet necessarily a very imperfect one, not only because the limits of the two classes admit of no precise definition, since the same kinds of disease sometimes belong to one, sometimes to the other; but also because there is a wide range of duration among diseases referred to the same class, as for example between a twenty-one days' fever, and the worst forms of plague and spasmodic cholera. Fevers in general are considered acute affections; the only considerable exception being those which are symptomatic of organic diseases, and which mostly assume the form of hectic. Inflammations, with very few exceptions, may be either acute or chronic; and so difficult is it often found to determine to which class a given case ought to be referred, that many modern pathologists have resorted to the expedient of distinguishing a third and intermediate class, which they call subacute.

Profluvia, hemorrhages, and dropsies, diseases which have much natural affinity with inflammations, are, like them, both acute and chronic; mostly assuming the latter form when they are symptomatic of organic affections. The cachexiæ are in their nature chronic; and it is well known that when inflammation occurs in persons whose constitutions are infected with scrofulous or tuberculous disease, it commonly assumes a chronic, and at most a subacute form. Organic changes and structural lesions are necessarily chronic. Of functional disorders, some are essentially acute, as apoplexy, hydrophobia, and tetanus; others almost always chronic, as dyspepsia and hypochondriasis; many, sometimes one, sometimes the other, as paralysis and the neuralgiæ; and, lastly, some are of an intermediate or anomalous character, being chronic as a whole, but acute as to the successive paroxysms, as epilepsy and spasmodic asthma.

However uncertain the prognosis of the duration of diseases may commonly be, it is, as a general rule, much less so in acute than in chronic affections; and in some of the former it is in a considerable degree determinate. Of these we find examples in certain endemic or epidemic fevers, as well continued as intermittent and remittent; in some of the exanthemata, especially small-pox and measles, and some varieties of herpes; in acute inflammations in general, including hydrocephalus acutus; in acute profluvia, especially when epidemic, as catarrh and dysentery; in hydrophobia, tetanus, and perhaps ischuria renalis. The acute diseases, whose duration can least be calculated upon, are such as are associated with the scrofulous or tubercolous diathesis, or with secondary syphilis; those inflammations in which the inflammatory action is but slight, as pertussis; and such as are prone to shift their seat, as especially rheumatism.

Of course in proportion as the nature of the disease itself throws little light on the question of its duration, we are obliged to have recourse to the particular circumstances of each individual case, and in chronic diseases these constitute almost our sole guide.

A subsidiary means of predicting the duration of some acute diseases is derived from the knowledge of what are termed *critical days*. They have been chiefly observed in fevers, and in this work are properly treated of under that head. A general notice of the subject is all that can be attempted here.

Critical days are those on which experience has shown that fevers most commonly terminate. Authors have more particularly noted as such the third, fifth, seventh, ninth, eleventh, fourteenth, seventeenth, and twentieth, being separated in the earlier stages by periods of two days, in the later of three, and perhaps even more. Supposing the distinction to be founded in truth, we are thus able to predict with more or less confidence, at any period of a fever, that it *may* terminate on the next critical day or on any subsequent one, but that its cessation is not likely to occur at any intervening time.

The term critical days properly denotes nothing

more than the fact of termination, without any reference to its being favourable or the reverse. As to this point some authors have, however, made a distinction of days in regard to fevers generally, and with more appearance of truth as to some particular diseases. Thus Sydenham, in his admirable description of small-pox, has noted the eighth day in the distinct form, and the eleventh in the confluent, as those on which the disease is most apt to terminate fatally.

It is obvious that the mere knowledge of the existence of critical days can be of little avail for prognosis if there be no means of predicting on which of them a disease is likely to terminate. This has been supposed to be in some degree furnished by certain intervening days called *indicative*, because the occurrence of particular symptoms on them is considered to denote the termination of the affection on the next critical day.

The law which determines the series of critical days in fevers of a continued type seems to be a modification of that which regulates the periodical recurrence and termination of the paroxysms of intermittents, and the less definite course of remittents. It seems indeed as though the existence of critical days was most discernible, and consequently most available for prognosis, in proportion as fevers tend to the remittent character: and it is probably owing to the slight tendency to this character in the common continued fevers of our own country that the subject so little either occupies our attention or influences our practice.*

6. *Liability to recurrence or relapse.*—By the former of these words is properly meant the reappearance of a disease after an interval of exemption from it; by the latter, its renovation during the period of convalescence. There are very few diseases that may not, and that occasionally do not, recur when circumstances favour their production. With some, however, it very rarely happens: such are, 1. diseases which are almost uniformly fatal; 2. those epidemic fevers which appear to be partly propagated by infection or contagion, as plague, yellow fever, and typhus, and also rubeola, scarlatina, variola, pertussis, influenza, and perhaps spasmodic cholera. It is to be observed that diseases which are manifestly contagious, without being epidemic, such as syphilis, are by no means indisposed to recur. 3. Diseases which are almost peculiar to infancy and childhood, or the adult age, are of course not likely to recur in after life: such are infantile remittent fever, convulsions, porrigo, chorea, chlorosis, and perhaps epistaxis. 4. The organic results of some diseases seem to oppose an obstacle to their recurrence. Laennec asserts that this is the case with extensive adhesions from pleurisy, and it is certainly so with hydrocele when cured by exciting adhesive inflammation.

The diseases which most frequently recur may be distinguished into two classes, according as the recurrence is regular and periodical, or irregular and as it were accidental. Those which ordinarily belong to the first class are few in number, the principal being intermittent fevers. In these, the type being once known, we are able to foretel the appearance of the next fit. The prognosis must, however, be formed with some limitation, since not only may art interfere, but there appears to be very often a natural tendency in these fevers to cease spontaneously after a certain though variable number of paroxysms. Some neuralgic affections, especially headach, frequently assume a periodical character, observing the ordinary periods of intermittent fevers, and that even when they cannot be referred to malaria. The only other diseases which are often observed to return periodically are gout and spasmodic asthma, and in these the periods of recurrence form no part of the general character of the disease, but vary in each particular case. There are besides numerous other affections which occasionally observe very exact periods of return. The principal are hemorrhages, especially hemorrhoids; profluvia, as diarrhœa; and some functional disorders, as mania, epilepsy, and jaundice. But as these peculiarities belong to the individual, and not to the disease, they are of no general interest in prognosis.

The liability of diseases to return irregularly and accidentally may in general terms be ascribed to the continued influence of some circumstance which stands in the relation of a cause, either predisposing or exciting, but more commonly the former. Such causes may be thus classed:

a. Organic disease frequently gives rise to the repeated recurrence of other diseases, and these may affect either the part in which the organic disease is seated, or others more or less remote. Of the former we have examples in the liability to repeated attacks of pleurisy, peripneumony, bronchial catarrh, and hemoptysis, which attends the presence of tubercles in the lungs; in the tendency to spasmodic stricture, where permanent stricture exists; in the frequent occurrence of partial peritonitis and ascites, when the liver is organically diseased; of menorrhagia, in cases of scirrhous uterus; and of affections of the intestinal mucous membrane, in disease of the mesenteric glands. We have examples of organic disease in one part causing repeated morbid affections of other parts, in the anasarca and various hemorrhages which attend diseases of the heart, and in hæmatemesis and melæna accompanying that of the liver.

b. Nearly allied to the preceding description of cases is the well-known tendency of chronic affections to assume more or less frequently during their progress an acute character. Perhaps this is most conspicuously seen in the serous membranes, as in the pleura, peritoneum, and arachnoid membrane.

c. In many cases the liability to a particular disease on the application of slight exciting causes seems referable to some defects, not amounting to notable disease, in the vascular or nervous apparatus of a part, the result of previous attacks. It is most conspicuously seen in affections of the skin and mucous membranes, as for example in ophthalmia, cynanche tonsillaris, catarrh and bronchitis, diarrhœa and dysentery, gleet and leucorrhœa, diseases which, if they have once occurred, often leave a manifest tendency to their reproduction. In numerous other cases, however, the

* One of the most exact and satisfactory reports which has appeared of late years on the subject of critical days in the fevers of our own climate is to be found in Dr. Welsh's account of the epidemic fever of Edinburgh in 1818.

tendency in a disease to reappear seems to admit of no such pathological explanation, nor indeed of any other satisfactory one, however we may attempt to conceal our ignorance by the use of such terms as mobility, excitability, and the like. In many of these affections the vascular system is prominently disturbed. Such are erysipelas, biliary calculi and jaundice, gout, rheumatism, hemorrhoids, puerperal hemorrhage, amenorrhœa, dysmenorrhœa, phlegmasia dolens, and calculous affections of the urinary organs. In others, as palsy, epilepsy, insanity, neuralgia, palpitation, angina pectoris, spasmodic asthma, hiccup, dyspepsia, colic, and hysteria, the nervous system seems to be most affected.

d. Repeated attacks of the same disease often originate in the presence of some constitutional diathesis or depraved state of the general health. Hence the frequent recurrence of constitutional syphilis and of scrofolous affection of the glands and joints, the formation of successive crops of tubercles in the same or different organs, and the liability to scirrho-carcinoma, medullary sarcoma, carbuncles, &c.

e. Affections peculiar to certain periods of life are liable to recur during those periods, as epistaxis in childhood, and cerebral hemorrhage in old age.

f. Affections which may be traced to the interruption of some function, as hysteria and vicarious hemorrhages to suppression of the menses, may of course be expected to recur as long as the interruption continues.

The practical application of our knowledge of the liability to the recurrence of disease under the several circumstances now enumerated, consists chiefly in the avoidance of the occasional and exciting causes, since the permanent and predisposing ones are for the most part beyond our reach.

By the term *relapse* is properly signified the renewal of a disease during the period of convalescence, or before the effects of the preceding attack have entirely disappeared. Hence it is almost exclusively applied to acute diseases, especially fevers and febrile affections generally, including acute inflammations. The liability to relapse may be said in general terms to be in an inverse proportion to the completeness of the recovery. In epidemics it appears to depend in part upon their prevailing character and tendency, being much greater in some than in others; and it seems to be a general rule that when an affection, which ordinarily terminates by some marked crisis, has receded without such an occurrence, or when it has disappeared early and suddenly, without running its usual course, there is a more than common danger of relapse. It is also laid down as a maxim by Hippocrates and other writers who treat of critical days, that when fevers end on non-critical days the patients are peculiarly liable to a relapse.

II. Of the Prognosis of Disease as deduced from the particular circumstances of individual cases.

Our judgment of the future in many cases of disease is greatly influenced by the consideration of their being *primary* or *secondary*, *idiopathic* or *symptomatic*. The question of the curability and probable duration of a secondary or symptomatic affection is commonly very much involved in the prognosis of the primary one. This general rule, however, requires some limitation. Thus dropsical affections, which are symptomatic of organic disease of the heart, are not unfrequently removed, at least for a time, though the primary affection be wholly incurable. There is, however, in such cases, as has been formerly observed, great liability to a recurrence of the secondary malady.

The principal cases in which prognosis is influenced by the secondary or symptomatic character of the disease may be classed under the following heads.

a. Fever which is symptomatic of local inflammation of an acute character cannot be removed while the inflammation subsists. With regard, however, to the febrile state which attends local diseases of a more chronic and passive nature, and which often assumes the form of hectic, the same position cannot be assumed, except with considerable modification. Here we not only often meet with great spontaneous variations, the causes of which are mostly but little known, but we even find the hectic fever, to a certain extent, under the control of remedies. Thus the power of sulphuric acid to diminish the sweating is generally admitted, and the influence of bark is attested by high medical authority.

b. When local inflammation or other disease arises during the progress of continued fever, it is by no means necessary that the primary affection should cease before the secondary one can admit of removal. Indeed, when the local affection does not proceed to disorganization, it more commonly disappears before the cessation of the primary fever. It may perhaps be assumed as a general rule that the symptoms of a local affection arising in fever are more prominent and severe than those of an idiopathic affection of the same character and tendency. The treatment of fever appears to be generally influenced by this rule, and its bearing upon the question of prognosis is obvious.

c. What has been above stated in regard to hectic fever is also applicable to other affections which are symptomatic of organic diseases; that is to say, the secondary affections are not only subject to great spontaneous variations, but may often be mitigated or removed by medical art, though the primary disease be permanent and incurable. As illustrations of this we may cite those symptomatic affections which are common to organic diseases in general, namely, hemorrhages, dropsies, and affections of the bronchial and gastro-intestinal mucous membranes, and many others which are more proper to particular ones, as pleurisy and peripneumony to tuberculous phthisis; dyspepsia, pyrosis, gastrodynia, and obstipatio, to organic diseases of the stomach dysentery, to those of the liver; and dysuria, tenesmus, &c. to diseases of the urinary and genital organs.

d. Affections which are symptomatic of a deranged or interrupted function are mostly very unmanageable till the latter is restored. The most remarkable examples are furnished by the

various diseases which attend amenorrhœa, such as hysteria in all its forms, regular and irregular, hæmatemesis, obstinate vomiting, suppression of urine, &c. While the menses are absent or defective, these affections are very little under the control of remedies; but though they often assume a threatening aspect, experience teaches us that there is very little danger to life. For our knowledge of the great and extensive influence of derangements of the digestive organs in producing or maintaining various morbid affections, we are very much indebted to the sagacity of Abernethy. These affections sometimes present a formidable aspect, such as violent palpitation of the heart or interruption of its action, angina pectoris, palsy, and even a state like apoplexy; others, though less alarming, are very distressing, as neuralgia and asthma; and all of them, however generally exempt from actual danger, can only be treated with success by means which act upon the primary disorder.

e. Besides the above principal varieties of symptomatic affections, there are some more anomalous ones which deserve notice; especially worms and teething, which give rise to convulsions and various other diseases of children; and pregnancy, the origin of a long list of disorders, as vomiting, indigestion, costiveness, &c. These are all more or less subject to the general rule, that the removal of the symptomatic affection is in a great measure dependent upon that of the primary one.

f. When one disorder succeeds to or takes the place of another, the prognosis does not appear to be in general different from what it would have been if the secondary affection had occurred primarily. Dr. Cheyne, however, states that hydrocephalus supervening upon and displacing enteric disease, is more dangerous than when it occurs primarily. On the other hand, insanity is found much more often to admit of recovery when it is induced by some preceding affection, as fever or pregnancy, than when it arises spontaneously.

g. When primary and secondary diseases subsist together, the complication generally makes the prognosis additionally unfavourable; as, for example, when ulceration of the intestinal mucous membrane is superadded to phthisis pulmonalis. Sometimes, however, the fatal termination of a disease appears to be retarded by such complications, as in the well-known case of mania suspending the progress of phthisis.

In many kinds of disease the prognosis is much influenced by the nature of the *exciting causes*. The following may be noted as some of the more prominent examples of this kind:

It seems to be a general rule that epidemic disorders are more tedious, unmanageable, and dangerous, than affections of the like nature and intensity which appear sporadically, and arise from some known causes peculiar to the individual, such as exposure to cold, intemperance, &c. This is very observable in regard to affections of the bronchial and gastro-intestinal mucous membranes. There seems to be an exception to this rule in some diseases which are traceable to the influence of marsh miasmata; as, for example, neuralgic affections, which are then more curable, supposing the future action of the cause be avoided, than when they arise from cold, &c.

Local inflammations, abscesses and ulcers, when originating from an external injury or other cause which affects the part only, generally afford a much better prognosis than when they appear spontaneously; because in the latter case they have generally a constitutional origin, often of the nature of a cachectic diathesis. Tetanus, however, is more fatal when the affection is produced by a local injury than when it is referable to a cause acting on the system at large, as cold. We may here advert to the well-known fact, that in fractures or other severe local injuries, the prognosis is more unfavourable when the violence done to the part is accompanied with a general shock to the system.

In some affections of the nervous system, the prognosis appears to be partly influenced by the nature of the exciting cause, though in a way which cannot easily be explained. Thus epilepsy and insanity are said to be peculiarly intractable when they have been first brought on by fear or terror.

The mode of invasion is a point of much importance in the prognosis of many acute diseases, as fevers and febrile disorders generally, including the exanthemata. The first shock is sometimes so violent, or the progress of the disorder so rapid, that before remedial means can operate, life is extinguished, or irreparable disorganization produced. This is often seen in severe epidemic diseases, as plague, spasmodic cholera, &c.; and, among local inflammations, in meningitis and ophthalmia. If we except cases of the above description, it may be laid down as a general rule, that in proportion as the first invasion of an acute disease is well-marked and decisive, it will be found not only more controllable by remedies and shorter in duration, but also less likely to terminate fatally, or to cause permanent disorganization. On the other hand, where a disease is insidious and imperfectly developed in its commencement, remedies are generally less efficacious; and even were it otherwise, the early diagnosis is often so obscured as to prevent their being resorted to with sufficient promptitude and energy. Chronic affections are generally more or less indistinct at their commencement, and are very often so much so as to baffle all attempts at precise diagnosis. In proportion as this is the case, the prognosis is commonly unfavourable, the efficacy of remedies being mostly less decisive, and the event often revealing an extent of disease little suspected in its earlier stages.

Regularity or irregularity of progress, as a guide to prognosis, is applicable only to disorders which have a pretty marked and determinate course, as especially to the exanthemata. In these affections, any considerable deviation from the accustomed course, as a premature disappearance of the eruption, furnishes an unfavourable augury; such cases not unfrequently ending fatally, even where there has been no peculiar severity of symptoms, or other circumstances, to excite alarm. Gout is another disease in which irregularities are often the precursors of dangerous and sometimes of fatal consequences. There is one disorder which affords an apparent rather than a real ex

ception to the preceding rule. It is well known that, in intermittent fevers, changes in the accustomed hours of access of the paroxysms, whether they occur spontaneously or are caused by the use of remedies, often predict the approaching cessation of the malady.

In many diseases, especially those of a chronic character, the prospect of recovery is much influenced, and in general unfavourably so, by the length of their *past duration*. This influence seems to result from various causes, of which what may be called the force of habit is perhaps the most considerable. Its operation is conspicuously seen in many of those affections which are chiefly referrable to the nervous system, as well as in others in which the occurrence of some secretion or other form of evacuation indicates disorder of the vascular apparatus of the part affected. Of the former we have examples in epilepsy and the neuralgiæ; of the latter in hemorrhoids and leucorrhœa; while spasmodic asthma and gout are cases of a somewhat mixed character. In all these affections, and in many others of the same kind, the hope of recovery is in general small in proportion to their duration, and to the influence of habit which that duration implies. Another cause which renders the duration of a disease unfavourable to the hope of recovery, is its tendency to produce changes in the organization of parts. Perhaps all the affections commonly called nervous have more or less of this tendency, as, for example, epilepsy and asthma. It is, however, more conspicuously seen in some other diseases, as ague, gout, and rheumatism; in all of which the inveteracy of the affection is found to be increased by the production of organic changes. A third mode in which diseases become more intractable by continuance, is by diminishing the vigour of the system, and consequently its powers of resistance. This is illustrated in many kinds of chronic discharges.

The cases in which the prospect of recovery is improved by the duration of the disease are chiefly those in which it is observed to have a natural tendency to exhaust itself after long continuance. Examples are furnished by some of the chronic cutaneous diseases, as porrigo, and perhaps lepra. A tendency of the same kind is in some instances connected with age. Thus external scrofula and dyspepsia, however intractable during the earlier periods of life, are often found to diminish or disappear in mature and middle age.

With regard to the influence of the duration of disease upon its danger, it is obvious that all those affections which have a tendency to destroy life, either by inducing fatal disorganization, or by exhausting the vital powers, become increasingly dangerous in proportion as their continuance is prolonged.

Of particular Symptoms. — In the infancy of pathology a great number of symptoms which, either singly or in conjunction, are now known to indicate certain kinds of disease, merely served as guides to predict the event of individual cases. Thus, much of what Hippocrates has said on the subject of prognosis more properly belongs to that of diagnosis; and it is probably in a great measure owing to the change above noted in the relative position of these two branches of medical science, that while the latter increasingly occupies the attention of physicians, and has given birth to many valuable systematic works in our own times, the former has, for the last half century, almost ceased to be the subject of distinct treatises.* That part of prognosis which is independent of diagnosis being thus restricted in its materials, will not require a large proportional space in this article. It will be found that in local affections generally the most prominent symptoms are essentially diagnostic, and therefore foreign to our present object. In affections of a more general nature, such especially as fever, the case is different; and numerous symptoms present themselves which do not appear to be diagnostic of any particular state of disease, but which greatly influence our judgment of the event. These will necessarily occupy a prominent place in the following enumeration. It must, however, be borne in mind that in many cases our knowledge is too imperfect to enable us to determine with certainty what symptoms are properly diagnostic, and what are merely prognostic.

It is a general rule that the disappearance of the several morbid circumstances in the condition and functions of the body which constitute disease marks the approaching return of health; and, in fact, great part of the prognosis of particular diseases, as stated in systematic works, is of this kind. It seems, however, useless to extend an article like the present by an enumeration of points so self-evident. The chief exceptions to the above rule are to be found in the disappearance of one or more morbid circumstances while others remain. Indeed, in a large proportion of cases of disease, the prognosis is rather deduced from a general consideration of all the symptoms than from changes in particular ones; and hence arises an imperfection inseparable from this branch of the subject.

As the consideration of every individual morbid symptom would be at once tedious and unprofitable, it will be sufficient to particularize those which are most important and of most general application to the subject of prognosis.

Symptoms chiefly referable to the nervous system. — Delirium being one of the most common symptoms of fevers and febrile disorders generally, cannot in itself be considered unfavourable. In two of its forms, however, it indicates a threatening state of disease; namely, the delirium ferox, which perhaps mostly implies meningeal inflammation; and the muttering delirium which is one of the characters of typhus and adynamic fevers. An access or increase of delirium sometimes precedes a crisis in fevers; and, on the other hand, its cessation, though a favourable occurrence when conjoined with other marks of lessening disorder, is not unfrequently but the commencement of stupor and coma, or a part of that delusive calm which has been already adverted to as sometimes taking place before the fatal termination of many acute affections. In encephalic inflammations generally, including acute hydro-

* In a list of fifty works appended to the article *Pronostic*, in the 45th vol. of the Dict. des Sciences Médicales, which was published in 1820, thirty-five are of dates prior to 1700, (a majority of them being rather comments on Hippocrates than original treatises,) fifteen between 1700 and 1777, and none later.

cephalus, the violence and duration of the delirium is one measure of the severity and consequent danger of the disease. In acute pulmonary affections and also in jaundice, the occurrence of delirium has always been regarded as more or less alarming. That which frequently follows some local injuries does not appear to denote peculiar danger. In chronic diseases generally, particularly in phthisis pulmonalis, its occurrence is one of the most unequivocal indications of the approach of death.

Besides delirium, there are other modifications of mental disorder very common in fever and encephalic inflammations, which, when they are prominent, generally denote a severe and formidable disease. Such are, an expression of great confusion in the countenance, corresponding confusion of thought, and want of any recollection of things said or done immediately before.

The expression of great anxiety in the countenance and manner is a very unfavourable symptom in acute affections; while hope and cheerfulness, when not arising from delirium, are of good omen, being at once a cause and an indication of amendment. In many chronic affections, however, these indications are reversed. Thus in dyspepsia, jaundice, hypochondriasis, &c., anxiety and depression of spirits by no means imply any well-founded alarm; while, on the other hand, in phthisis pulmonalis there is often confidence of recovery even to the last period of existence.

A strong presentiment or anticipation of death is at all times ominous, since, apart from every consideration of its foundation, it often appears to be the cause of its own fulfilment. The same may be said of a confident anticipation of recovery, whatever be its source; for whether connected with religious impressions, or excited by the prognostics of pretenders to the healing art, it often produces the most extraordinary effects.

The opposite states of preternatural susceptibility and complete insensibility of the organs of the external senses are alike unfavourable symptoms in fevers and febrile diseases. Hence, a very contracted or dilated and immovable condition of the pupil, as well as strabismus, and that state of the eye in which it remains constantly half closed with only the white part visible, have always been considered of bad omen in such affections. It is, however, to be observed that deafness is a frequent occurrence during convalescence from fevers; and that extreme sensibility of the eyes and of the whole surface are not uncommon in hysterical affections, and of course of little moment.

In febrile disorders, sensibility to suffering, with complaint of pain, are generally favourable, while the total absence of both is always a bad symptom. Severe attacks of local pain are not unfrequently the precursors of a crisis; and a peevish sensibility to uneasiness of any kind is proverbial as an indication of approaching convalescence.

In acute inflammations severe pain in the affected part cannot in general be considered as alarming. The principal apparent exception is found in enteritis; in this case, however, the severity of the pain seems chiefly owing to a spasmodic affection of the muscular coat of the intestine. Throbbing pain is a well-known precursor of suppuration.

With regard to local pains, severe headach is an unfavourable symptom in peripneumonia notha, and perhaps in pulmonary affections generally. A sudden and violent attack of pain in the head, preceding apoplexy, denotes a very dangerous form of that disease. Very severe pain in the loins has been observed to precede the confluent form of small-pox, and at the invasion of febrile disorders in general, mostly portends an attack of considerable violence.

Pains which are prone to shift their seat, as in acute rheumatism, are generally less manageable than such as are fixed.

The sudden disappearance of pain, without any known or satisfactory cause, is always alarming, as is seen in ileus, enteritis, and hernia, although in these cases it has been too exclusively regarded as an indication of commencing gangrene.

The sensation of pricking in palsied limbs often precedes the recovery of their power.

In fever, constant lying on the back, with the legs drawn up, a continual tendency to sink down in the bed, or general rigidity of the trunk and limbs, are all unfavourable symptoms; while recumbency on the side, with occasional changes of position, and a flexible state of the muscles, are of good omen. In peritoneal inflammation great retraction of the lower extremities upon the trunk indicates a severe affection; while their occasional extension, together with the capability of sitting upright, are sure signs of the subsidence of the inflammation.

Convulsions and spasmodic affections are much worse symptoms in the advanced than in the early stages of fevers, and are generally less alarming in women and children than in adult males. Indeed, in young children (as Sydenham remarked in small-pox) their occurrence at the invasion of febrile disorders is often rather favourable than otherwise. In general it is not so much their severity as their continuance and frequent recurrence which imply danger. Among the different forms of convulsive movements, subsultus tendinum, picking at the bed-clothes, &c.; tremours of the hands and lips, and grinding of the teeth, are more peculiarly alarming, as being common indications of approaching dissolution.

A propensity to keep the hands and feet out of bed, and the trunk uncovered, commonly denotes a state of severe disease. Any form of paralysis occurring in fevers and acute inflammations is generally more or less alarming. Severe rigors are not ordinarily unfavourable in acute affections, as they tend to produce speedy reaction. In chronic diseases they are much more often so, mostly implying internal suppuration.

Extreme debility, or loss of muscular power, almost always justifies alarm.

Somnolence, occurring at an advanced stage of febrile affections, if it be associated with other indications of their decline, and especially if it follow some form of crisis, is highly favourable. In other circumstances, however, it is often but the beginning of a state of torpor, eventually passing into fatal coma. Sleep which is hurried or disturbed by convulsive startings, or in which

the eyes are half open, showing the white part only, or in which the lower jaw drops, is of bad omen. Constant wakefulness is always an unfavourable symptom.

Of all the indications of approaching death, and of all the forms in which it takes place, perhaps none is more general than coma. Yet coma does not invariably portend death. In fevers attended with much cerebral disorder, and in idiopathic affections of the encephalon, more particularly in children, it is not unfrequently recovered from. In pulmonary affections it is almost always a fatal symptom.

Circulating system.—The prognosis deduced from the action of the heart and arteries varies greatly in different diseases and under different circumstances. Extreme weakness, with great frequency, and perhaps irregularity of the pulse, is one of the most constant precursors of death. The principal exception is found in cases of profuse hemorrhage, when the pulse often remains full and vibrating, almost to the last moments of life. A very great degree of frequency, such as any excess above 150, is of itself almost invariably indicative of danger; and under some circumstances, especially after parturition, a pulse even above 100 justifies the apprehension of impending mischief. In cerebral affections more particularly, the pulse is liable to great variations of character, and these are sometimes valuable for the purposes of prognosis. Thus in apoplexy, the transition from a small, weak, and rapid pulse, to a full, strong, and labouring one, is always alarming. Mere irregularity or intermissions, especially when met with in advanced life, are by no means so alarming as is popularly supposed; and the most vehement palpitations of the heart, alternating with protracted intermissions, are met with in those sympathetic affections of the organ which experience shows to be attended with little real danger.

Syncope is chiefly an alarming symptom when it is connected with disease of the heart and larger arteries, or is the result of extreme exhaustion, as from profuse hemorrhage.

With regard to morbid conditions of the blood, the separation of a thick and tenacious coat of fibrine, with great contraction of the coagulum and concavity of its surface, though mostly indicative of active local inflammation, or of a general inflammatory diathesis, cannot in itself be regarded as an indication of danger. The dark, grumous, or pitch-like blood, which is commonly met with in the first or congestive stage of severe febrile disorders, and in some other affections, though a much more formidable appearance, does not by any means necessarily imply great danger, since it often disappears after one or more bleedings, as in diabetes and fevers. That dissolved and watery state of the blood in which it resembles claret, and is scarcely or not at all coagulable, such as is often seen in purpura, is much more alarming than either of the two preceding.

The prognosis of hemorrhage, when considered as a separate disease, has already been adverted to. As a symptom of other diseases, it is often an important guide to their prognosis. In febrile disorders it is presented under two very different aspects; in the one appearing as a critical symptom, and denoting the favourable termination of the malady, in the other constituting an occurrence of much danger. The distinction between the two must of course be drawn from the circumstances under which the hemorrhage takes place. The modifications of hemorrhage in which the characters of the effused fluid are widely different from those of natural blood, such as the black vomit of yellow fever, and the alvine discharges in melæna, are always alarming. Hemorrhages, when occurring in chronic affections, as in tuberculous disease of the lungs, scirrho-cancer, organic disease of the heart, &c. though often producing some temporary relief, must always be considered as very unfavourable in relation to the ultimate event.

Respiratory system.—There is scarcely any more certain indication of severe and dangerous disease than great disturbance of the respiratory function, if we except those cases in which it is referable to some spasmodic affection of the organs, of which asthma is the most considerable example. Slow, labouring, and irregular, or hurried and feeble respiration, is one of the most common precursors of death; and where an audible rattle in the throat is also heard, that event may almost invariably be pronounced near at hand. Spasmodic asthma is almost the only case in which orthopnœa does not imply a formidable state of disease. Stertorous breathing, which is in a great measure peculiar to severe cerebral disorders, is always more or less alarming. Extremely fetid breath in fever is unfavourable.

Deep sighing is sometimes one of the most prominent indications of such a degree of exhaustion after hemorrhage as leaves little hope of rallying. Moaning is chiefly observed in children, especially in acute hydrocephalus, and is an unfavourable symptom.

In chronic diseases which are attended with cough and expectoration, these symptoms are commonly observed to cease before death. In aged persons, the disappearance of an habitual bronchial affection is always an alarming circumstance, being generally a prelude to some fatal attack, as of apoplexy. The prognosis to be drawn from the character of the sputa varies with the nature of the existing disease. Thus purulent expectoration, when associated with tuberculous disease, is always alarming; in chronic bronchitis it is less decidedly so, and in acute bronchial affections supervening upon fevers, &c. the prognosis is often good, even though the excretion be of an alarming extent and duration. This is perhaps still more strikingly observed in abscess of the liver communicating with the bronchial tubes.

Notwithstanding many occasional exceptions, it cannot be doubted that the frequent appearance of blood mingled with the sputa must be ordinarily regarded as a very unfavourable circumstance. Fetid and black sputa are always alarming.

Hiccup occasionally precedes a favourable reaction in some cases of acute disease, as for example in the epidemic cholera; but much more commonly it appears in the advanced stages of both acute and chronic diseases as one of the indications of approaching death. In fevers, hurried or inarticulate and scarcely intelligible speech is generally an unfavourable symptom.

Organs of digestion.—Perhaps there is no one single circumstance indicative of approaching convalescence of such general value as the return of the tongue to its natural state; and, on the other hand, its various deviations from that state are among our best guides for judging of the severity and probable danger of disease. A perfectly dry tongue, whether its surface be polished, of a livid red or mahogany colour, or covered with a rough coating of brown or blackish fur, is at all times indicative of severe and commonly of more or less dangerous disease; while a natural degree of moisture almost always justifies a favourable augury, except in affections which are attended by hectic fever. Redness of the tip and edges, with unnaturally prominent papillæ, is too commonly met with in acute diseases of most kinds, especially those in which there is much irritation of the gastro-intestinal mucous membrane, to be regarded as unfavourable, unless when it is peculiarly vivid; but in chronic affections, continued redness of the tongue commonly justifies apprehensions. Paleness is not a threatening symptom, except when it is one of the results of alarming hemorrhage. The temperature of the tongue may be said in general terms to furnish the same indications as that of the surface of the body. An extreme degree of coldness has lately excited much attention, as being one of the characteristic symptoms of the present epidemic cholera in its worst form. The opposite states of tremour and of rigidity with retraction of the tongue, have been noted as unfavourable symptoms in fevers and other acute diseases.

Brown or black sordes on the lips, gums, and teeth, always denote more or less of danger. Bleeding of the gums, when it occurs late in fever, as part of a general hemorrhagic disposition, is an unfavourable symptom. The lips, more than any other part of the body, indicate, by their livid or purple colour in severe affections of the organs of respiration and circulation, that want of arterialization of the blood which is almost always an alarming symptom. Coldness of the lips and dropping of the under lip and jaw are among the features of the well-known facies Hippocratica. Salivation has been occasionally noted as critical in fevers, but its value in prognosis is chiefly seen in those cases in which mercury is given with a view to produce its specific effect. In these its appearance often warrants the anticipation of a favourable change. An aphthous state of the mouth and fauces is generally alarming, but more decidedly so in chronic than in acute affections, and in adults than in children.

An unnatural degree of appetite is sometimes observed to precede the development of severe inflammation of the gastro-intestinal mucous membrane; but it is chiefly in relation to convalescence that the appetite is a guide to prognosis, for its return, after a period of more or less complete anorexia, is one of the surest marks of returning health. Its sudden manifestation by a craving for some particular kind of food, after severe and protracted cases of fever, has been often noted as the first indication of a recovery which had previously been despaired of.

In febrile disorders, intense thirst always implies a severe affection; but its apparent absence, under circumstances in which it is ordinarily present, is a far more dangerous symptom, as being one of the indications of a general loss of physical sensibility.

Difficulty of swallowing, when it results from loss of muscular power in the œsophagus, as in the advanced stages of fever, hydrocephalus, apoplexy, and palsy, is always an alarming symptom. When it arises from some mechanical obstruction, the prognosis of course varies with the nature of the particular cause.

Vomiting at the commencement of febrile disorders cannot be considered as unfavourable, unless it be very severe and protracted. In acute affections of the gastric mucous membrane, as well as in chronic diseases of the stomach, it may furnish some kind of index, though certainly no constant or sure one, of their severity and danger. Though vomiting is popularly associated with the very notion of cholera, it is of itself no guide to our prognosis in that affection, being sometimes very inconsiderable in its most severe form. In cerebral affections, unless it recur very frequently, it is often rather a favourable symptom, indicating the continuance of physical sensibility. Thus, after concussion, it is one of the marks which distinguish a temporary suspension of the cerebral functions from a state of perfect coma. Vomiting of black matter, as in yellow fever, and sometimes in melæna,—of putrid, as in some very bad forms of fever,—and of fæces, as in ileus, are all alarming symptoms. There is one case in which the most protracted and uncontrollable vomiting can hardly be considered dangerous,—namely, when it is merely a symptom of hysteria. In pregnant women, especially in the earlier months of gestation, it is often peculiarly obstinate, without giving just occasion for alarm.

Diarrhœa, like other evacuations in febrile affections, occurs under two circumstances widely differing in their relation to prognosis; being in the one case critical, in the other a cause of exhaustion, often connected with severe disease, or even disorganization of the intestinal mucous membrane. Diarrhœa is also critical in some other affections, especially those in which there is much congestion in the abdominal viscera; it also often marks the solution of colic and ileus. Black and pitchy stools are sometimes met with in critical diarrhœa; but when evacuations of this kind, instead of marking the solution of an acute disease, assume a more chronic character, as in melæna, the prognosis is mostly unfavourable. Hemorrhage from the bowels is sometimes critical in fevers, but is more often one of the results of a general hemorrhagic tendency which rapidly exhausts the patient's remaining strength. Involuntary passage of the fæces is under all circumstances alarming. Diarrhœa, when it occurs in the course of chronic affections, commonly renders the prognosis increasingly unfavourable, because it mostly implies the extension of disease to the intestinal mucous membrane. In such cases it very often ceases for some hours before death, being one indication of the approach of that event. Great insensibility to the action of emetics and purgatives is an alarming symptom in many cerebral diseases, especially the acute hydrocephalus.

A tympanitic state of the intestines generally

denotes danger, though, as Dr. Abercrombie has shown, it is sometimes recovered from, even after enteric inflammation. A hard and tumefied state of the hypochondria and neighbouring parts has been long noted as an unfavourable symptom, except when, as is sometimes the case, it precedes a critical diarrhœa. Great depression of the abdomen, so as to make the hips and false ribs prominent, is indicative of a threatening state of things.

If we except some severe affections of the biliary system, met with in tropical climates, a copious secretion of healthy bile is generally a favourable occurrence. It was found very commonly to indicate recovery in the epidemic cholera of India. Jaundice supervening upon cerebral affections is a dangerous symptom, and in all circumstances that form of it in which the skin is of a green hue justifies a much worse prognosis than the yellow variety.

Urinary organs.—A complete, or nearly complete cessation of the renal function is always dangerous (unless when it is part of an hysteric affection), being very commonly followed by fatal coma, both in children and adults. Retention of urine from insensibility of the bladder is an unfavourable symptom in fever; its involuntary discharge is still more so. Bloody urine is occasionally critical; but more often, like other hemorrhages in the advanced stages of fever, it implies danger. Of all the occurrences which mark a crisis or favourable turns in fevers and inflammations generally, none is more common in our own climate than a copious deposition in the urine, sometimes of bilious matter, but more often of sediments chiefly composed of lithic acid and its compounds. In fact, when these are found in the urine, the prognosis is almost always good, except in cases attended with hectic fever; whereas the presence of the earthy phosphates as commonly denotes a dangerous state of disease. Albuminous urine is decidedly unfavourable, unless perhaps in cases of acute dropsy.

Sexual organs.—Amenorrhœa is a common attendant of many chronic diseases, generally occurring when they have made some progress, and, consequently, giving a more unfavourable aspect to their prognosis.

[Diseases which occur during *menstruation*, and especially during *pregnancy*, are esteemed to be more severe, and, as a general rule, such is the case. Moreover, in the latter condition, they may induce abortion or premature delivery, and thus add to the danger. Yet certain affections seem to be masked, if not arrested, in their development by pregnancy,—tuberculosis of the lungs, for example, which appears, however, to run its course with more fearful rapidity after *delivery*. The *puerperal state* adds likewise to the danger of serious maladies.]

The skin and subcutaneous tissue.—As to colour; a livid, purple, or leaden hue of the lips, cheeks, and surface generally, is a symptom indicative of danger. Sudden and frequent variations of colour, a circumscribed flush of the cheeks, extreme pallor, or its opposite, a very high degree of redness (when not from an exanthematous affection), are all unfavourable symptoms. In eruptive disorders, the imperfect development of the eruption, an unnatural colour of it, or its premature recession, are circumstances generally more or less alarming.

As to temperature: the opposite extremes of intense heat and death-like coldness are both alarming. Partial and unequal distribution of heat, especially that sense of burning which is often felt in the palms and soles in chronic diseases attended with hectic fever, and also frequent variations of temperature, are unfavourable. Coldness of the extremities is one of the most familiarly known precursors of death.

Moderate perspiration, if diffused over the body, attended with warmth, and not of long duration, is almost never unfavourable, and often critical. The extremes of dryness and moisture, like those of heat and cold, are dangerous; but especially moisture when combined with cold, as in the cold clammy sweats which often denote approaching death. Partial sweating, as of the head, chest, or extremities (as in phthisis pulmonalis), is always unfavourable. Perspiration of a fetid, cadaverous, or urinous odour, is an alarming symptom, unless it belong to hysteria. Sydenham observes that sweating in the eruptive fever of small-pox denotes that the disease will assume the distinct form.

Petechiæ, vibices, ecchymosis, and oozing of blood from the skin, are always unfavourable symptoms, though in various degrees, depending on the particular circumstances in which they occur.

When œdema or anasarca appears towards the termination or after the cessation of acute diseases, it is rarely alarming, and sometimes even critical. On the contrary, in chronic and organic diseases it always confirms a prognosis already unfavourable; and in these cases its disappearance, especially when sudden, is often among the indications of approaching death.

Abscesses and buboes are analogous to excretions, inasmuch as they are sometimes critical, and at others complications, which increase the patient's sufferings and accelerate his death.

Emaciation, even to a great degree, is rarely alarming when it is the result of acute disease. In chronic diseases it almost invariably renders a prognosis otherwise doubtful decidedly bad. To this head may be referred most of those well-known features which together make up the facies Hippocratica; namely, the pointed nose, sunk eyes, shrivelled ears, hollow temples, and pale, black, livid, or lead-coloured complexion.

Besides those circumstances which form part of the disease itself, there are others pertaining to the individual affected, the climate which he inhabits, the season of the year, &c., which often materially influence our prognosis of the future. An attempt to estimate the value of all these with any degree of exactness would involve an extension of this article much beyond the limits assigned to it; a brief review of some of the leading facts is, therefore, all that can be attempted.

Sex.—The influence which sex has on prognosis is chiefly referable to affections of the sexual organs, especially of the female. It has been already observed that the various morbid affections which are apt to occur about puberty, or for a few years after, when the menses are absent, such as hemorrhages, disorders of the digestive organs, different modifications of hysteria, &c., though often and apparently threatening, scarcely ever

justify alarm, unless they are complicated with fixed local disease, as tubercles, &c. The sudden suppression of the menses, as from cold or terror, is very apt to be followed by severe and often tedious disorders of various kinds. Morbid affections occurring about the time of the natural cessation of the menses often assume a very formidable character, resulting in scirrhus of the womb or breast, or organic disease of other kinds. The various local affections which immediately depend on pregnancy, as vomiting, hemorrhoids, œdema, &c., may of course be expected to cease with their cause. Affections which partially or wholly disappear when conception takes place, such as phthisis and mania, may be expected to return with equal or increased energy after parturition. The prognosis is considered more unfavourable in pregnant females than in others, after severe injuries and surgical operations. It may perhaps be assumed as a general rule, that in the pregnant state local affections are attended with symptoms more severe than those which would accompany them under other circumstances. If this be the case, a better prognosis will commonly be justified than would otherwise be admissible.

Age.—The difficulties and sources of error which are inseparable from the art of prognosis under all circumstances, are found to be peculiarly great in relation to the diseases of infants and young children. In them the powers of life are easily overwhelmed or soon exhausted, so that affections comparatively slight are often rapidly and unexpectedly fatal. On the other hand, if those powers are adequate to sustain the shock of disease till its violence is past, recovery commonly takes place with peculiar rapidity, and often under circumstances apparently the most desperate. [*Nil desperandum* should be the maxim of the physician in such cases; for, to use the language of Chomel, (art. *Prognostic*, in *Dict. de Méd.* xxvi. 120, Paris, 1842,) childhood is the age of resurrections.] If there be one class of affections more peculiarly dangerous than others in the earliest periods of life, it is severe injuries of the skin. Hence burns, even of very inconsiderable extent, and small blisters, are often speedily fatal. As children are much more constitutionally disposed to convulsive affections than adults, their appearance is in general proportionately less alarming; yet violent, or rather protracted convulsions, are very frequently the cause of death in infants. In childhood, the prognosis of surgical operations is commonly better than at other periods of life, not only from the activity with which nature carries on the work of reparation, but from the absence of those depressing moral causes which at a more mature age so often paralyse the physical powers of the system.

[Yet under two years of age, owing to the great impressibility of the nervous system of the infant, there is greater danger of convulsions from operations.]

In many affections the prognosis is greatly modified by the advance from childhood to puberty, and from puberty to manhood and old age. Of the former we have illustrations in rickets, external scrofula, epilepsy, chorea, and urinary calculus, disorders which, when most intractable in childhood, often spontaneously improve and disappear about puberty, or in the approach to manhood. On the other hand, some of these very affections, especially epilepsy and chorea, not unfrequently make their first appearance about puberty. Indigestion arising from irritability of the gastric mucous membrane, a very common and troublesome affection in youth and early manhood, often gradually diminishes with the approach of middle age. The influence which age has upon prognosis in regard to many disorders of females has been already considered in connection with the subject of sex.

The circumstances of very advanced age are in some respects analogous to those of infancy, in others conspicuously different. The vital powers being feeble, as in infants, are easily overwhelmed; and thus comparatively slight attacks of bronchial inflammation, vomiting, purging, hemorrhage, &c., often rapidly carry off old people. But unlike the early stages of life, the power of reparation being no less feeble than that of resistance, many diseases, not in their nature directly fatal, admit of very imperfect recovery, and often lead to gradual exhaustion. Fractures and ulcers of the surface are examples familiar to every one.

[On these points, much light has been thrown by statistical observers, to which a brief allusion only can be made here. It is well known, that more males are born than females; yet there are manifestly, during the early stages of life, agencies operating to reduce the proportion of the male sex. (Quetelet, *Sur l'Homme*, i. 43, Paris, 1835, and Burdach's *Physiologie*, u. s. w., i. 587, Leipz. 1835, cited in the writer's *Human Physiology*, 5th edit. ii. 406, Philad. 1844.) The investigations of Dr. Emerson (*Amer. Journ. of the Med. Sciences*, for Nov. 1835, p. 56) exhibit clearly that the greater liability of males to accidents does not furnish a sufficient reason for their greater mortality;—the deaths reported in the Philadelphia bills, under the head of casualties, constituting but a small proportion of the whole mortality; and this, when burns and scalds are included—being more considerable in the case of the female. The gross male mortality under the twentieth year, for the ten years from 1821 to 1830 inclusive, exceeded the female in the ratio of 7.94 per cent. The diseases which seemed to be particularly obnoxious to the male sex, were, according to the Philadelphia bills, the following, arranged in the order of their decreasing mortality.—Inflammation of the brain; inflammation of the bowels; bronchitis; croup; inflammation of the lungs; fevers of all kinds, except scarlet fever; convulsions; general dropsy; dropsy of the head, and small-pox. To these sources of mortality may be added those under the head of casualties, and others vaguely designated debility, decay, &c. The few cases in which the deaths of females predominated were—consumption, dropsy of the chest, scarlet fever, burns and scalds, and hooping-cough. The excellent reports of the Registrar General of Births, Deaths, and Marriages in England, contain much valuable information on these heads.]

Constitution, &c.—In persons of vigorous constitution, whether of the sanguine or melancholic temperament, acute disease, though often vehement and proportionately dangerous, is commonly more under the control of active remedial measures than in those of an opposite habit. Weak

ness and exhaustion not only predispose to inflammatory affections, but also render their occurrence more dangerous, even though they may not assume a very intense or vehement aspect. Persons of delicate form, lax fibre, and great physical and moral susceptibility, whether their temperament be sanguine or melancholic, are so liable, under various and even opposite circumstances, to become the subjects of tuberculous or other incurable chronic affections, that in them the prognosis of the ultimate event of even slight disease is generally more or less doubtful.

In almost all circumstances of disease, a calm, equable, and cheerful constitution of the mind tends to render the prognosis more favourable. In cases of severe local injury, and after surgical operations, it is found to be of the greatest importance.

With regard to habits of life, the peculiar danger of almost every severe malady, and often of trivial ones, to gluttons, drunkards, debauchees, and those whose constitutions are broken down by alternations of excess and privation, is familiarly known. This partly explains the frequent extreme fatality of epidemic diseases in armies, especially when moral causes of a distressing nature are superadded.

[Yet when fatal epidemics threaten, the abandonment of long-cherished habits — even if intrinsically objectionable — may render the individual more liable to their attacks, and the supervening disease more dangerous.]

In connection with facts of this kind may be mentioned the far greater mortality of infants in foundling than in lying-in hospitals; no advantages of cleanliness, ventilation, and care, compensating for the deprivation of that mode of sustenance which nature has provided for the first months of existence.

A marked constitutional tendency to any form of disease, whether it be hereditary, or common to the members of a family of the same generation without the suspicion of inheritance, or peculiar to the individual himself, generally makes the prognosis decidedly more unfavourable.

Climate often influences the prognosis of disease. In tropical countries acute diseases are commonly more vehement in their attack, more rapid in their progress, and more apt speedily to cause irremediable disorganization, than in temperate regions. Hence the prognosis is generally more unfavourable. On the other hand, temperate climates, being most commonly variable, are more apt, by the repeated irritation which frequent and sudden changes in the atmosphere produce, to render chronic affections, and especially those of the respiratory organs, incurable and ultimately fatal. It is perhaps from a similar cause that syphilis is generally found to be a more tractable and less dangerous disease in warm than in cold and variable climates. Convulsive affections, particularly tetanus, are observed to be not only more common, but also more fatal in hot countries. It is hardly necessary to state, that in all diseases which arise from local causes, such as marsh miasmata, the prognosis must be proportionately bad while exposure to the influence of those causes continues.

Season.—The season of the year is a circumstance of some importance in the prognosis of many diseases. This is in general better in spring and summer than in autumn and winter; and more particularly so with regard to scrofulous and tuberculous affections, and diseases of the pulmonary organs, among which measles may be enumerated. It has been noted from the time of Hippocrates downwards, that autumnal intermittents are both more severe and more intractable than vernal ones; and perhaps the observation is generally applicable to continued fevers, though subject to much exception.

The varieties of form and character assumed by diseases in different years, or at different periods of the same year, and which mark what Sydenham calls the constitution of the season, of course involve corresponding varieties in the prognosis. The experienced tendency of particular epidemics is indeed often found to be a more certain guide to our judgment of the future than could be derived from a mere consideration of the symptoms; a point which has been justly insisted on by Dr. Gooch in relation to puerperal or peritoneal fever.

[The *special* prognosis, in case of epidemics, will be regulated, to a certain extent, by the *general* prognosis. At the incursion of certain epidemics, as of cholera and scarlatina, the prognosis is, at times, exceedingly unfavourable; but after awhile the disease becomes milder, and often—it must be borne in mind—not owing to improved treatment. Such was the fact with the cholera especially, which not unfrequently on its first appearance destroyed almost all that were attacked by it; and afterwards became much mitigated; yet, under all treatment, the mortality from it was, on the whole, much the same every where. (See Cholera.)]

The effect of remedies previously tried, whether in the same person under a preceding similar attack, or (as in the case of epidemics) in other persons similarly affected, is often an important aid to our prognosis of their operation, and consequently of the event of the malady.

Edward Ash.

PROLAPSUS UTERI. See Uterus, Diseases of the.

PRURIGO, (from *prurigo*, itching,) is arranged by Willan, Alibert, Rayer, Biett, and others, as a papular affection of the skin; but the eruption is generally very obscure. There are several varieties of prurigo. The chief characteristic of all of them is severe itching, augmented by sudden exposure to heat. Where any eruption appears, and this seldom occurs except when the spot which itches is rubbed or scratched, the papulæ are of the same colour as the adjoining cuticle. The disease is either *general* or *local*, and as such only shall we regard it, as we are decidedly of opinion that the three *general* species designated by Willan, under the terms *mitis*, *formicans*, and *senilis*, are merely modifications of the same affection, depending on the state of the individual, and the changes that age produces in augmenting the severity of all diseases, more especially those of the skin. The propriety of separating the *local* from the *general* pruriginous affections requires no comment. No age, no sex is

exempt from the attacks of prurigo; it is observed to make its appearance in all seasons, and to find its victims in every rank of life.

1. **General Pruriginous Affections.** — When the disease assumes that mild form which Willan has denominated prurigo *mitis*, the itching is first experienced upon the shoulders, the breast, the loins, the arms, and the thighs. No papulæ appear to the naked eye; but if the finger is passed lightly over the affected parts, they are felt soft and large in the skin; as a consequence of itching, small thin black scabs are here and there conspicuous, and the cuticle between them is slightly reddened. Constant friction occasionally produces inflamed pustules, but these must always be regarded as incidental. This variety usually appears in young and otherwise healthy individuals, and commonly makes its attack in spring and summer. In the more severe form of the disease, the prurigo *formicans* of Willan, the papulæ are larger, but less obvious than in the milder variety of the disease. It affects the whole of the body except the face, the palms of the hands, and the feet; but they are chiefly seated on the loins, the back of the neck, and the thighs. The same small scabby points are also scattered over the affected parts as in prurigo *mitis*. It occurs more generally in adults than in the young, and is not more prevalent at one season than at another. The duration of both varieties is considerable, but the *formicans* is the most lasting and difficult of cure: it sometimes continues for two or more years. The pertinacity of the disease, however, is most striking in the third variety, the prurigo *senilis*, which differs from the two former only in the greater magnitude of the papulæ: this variety often continues for the remainder of life, rendering it truly wretched.

In all the varieties the itching is intolerable, augmenting in comparative severity according to the age of the patient. Thus in prurigo *mitis*, although severe, it is supportable, but it is much aggravated by sudden exposure of the naked body to the air, at the times of dressing and undressing; it is also increased by exercise and heat. In *formicans* the itching is more incessant, and often accompanied by the sensation of ants stinging the skin, whence the appellation *formicans;* but this feeling is usually more like hot needles running into the skin than the stinging of ants. In the *senilis* the itching is insupportable and more permanent than in either of the other varieties, tormenting the patient to a degree almost sufficient to cause phrenzy; but it is sometimes surpassed by the stinging in *formicans*, which often causes cramps and contractions of the extremities in a remarkable manner.

When great cleanliness is neglected in any of the varieties of prurigo, pustules and vesicles sometimes appear among the papulæ; and when the disease has been of long continuance, the skin acquires a preternatural thickness, the cuticle separates in a scaly scurf, and rhagades form. In these conditions of the surface, in dirty persons, pediculi are observed to infest the fissures of the altered cuticle. These appearances of pustules and other changes during the continuance of prurigo have led to the erroneous opinion that the milder variety may be converted into itch and impetigo. The disease may be complicated with these affections, but its conversion into them may be fairly doubted.

The *causes* of prurigo, whatever form it assumes, are obscure. Its appearance, however, is often preceded by morbid affections of the stomach, sickness, gastrodynia, cephalea; sometimes it supervenes upon particular kinds of diet, namely, salted meats, shell-fish, and even other kinds of fish, namely, mackerel, herrings, and salmon: it has also followed the free use of fermented liquors and spirits, and, occasionally, excess in the use of vinegar and condiments and pickles made with it. We have witnessed an instance of a temporary prurigo from the use of the crystallized citric acid, in the formation of the effervescing draught, although no such effect was produced when recent lemon-juice was employed. It often appears among the lower classes of society, when they are lodged in damp and ill-ventilated apartments, badly nourished and ill-clothed. It is also observed to attack most frequently persons of spare habits, with sallow complexions, subject to visceral diseases, who are reduced in strength by over-fatigue or watching, or lowered in vital energy by mental affections. But although these may be regarded as predisposing causes of prurigo, yet the condition of the nervous system that renders it morbidly excitable, and which really constitutes the disease, is still unknown. It is easy to conceive that, as age advances, the secretions must necessarily become more acrid; and this may account for the greater severity and pertinacity of the disease in old people; but as it appears in all ages, there must exist some peculiar state either of the secerning system, which supplies the acrimony that may be supposed to act on the cutaneous nerves and capillaries to produce the disease, or some altered condition of the extreme nerves that renders them more susceptible of impression from ordinary agents than in the healthy state of the system. What either of these states consists in we have yet to learn.

With respect to the *diagnostic* symptoms that enable us to recognise prurigo from other cutaneous diseases, the chief are undoubtedly the obscure, or almost invisible, character of the papulæ, and the degree of itching attending them. It might be confounded with lichen; but the papulæ are larger, softer, and less apparent than those of lichen, which also never display the minute black crusts that often appear in prurigo; and the itching in the former disease is much less both in degree and in permanence than in the latter. With itch it is not likely to be confounded by those who are familiar with the appearance of that loathsome disease. Itch is, besides, a vesicular affection, and the vesicles being acuminated and filled with a pellucid lymph can scarcely be confounded with the soft flat papulæ of prurigo: the site of scabies also differs from that of prurigo; the former occupies chiefly the fore-parts of the arms and the under part of the thighs, the spaces between the fingers and the axillæ and the flexures of the limbs; the latter, regarded as a *general affection*, has its seat mostly on the shoulders, the back, and the fore-part of the thighs. Scabies is contagious, prurigo is not communicable by contact. It is scarcely possible to confound it with ecthyma,

eczema, impetigo, or any other cutaneous eruption.

The *prognosis* in prurigo must always be uncertain as far as respects the continuance and curability of the disease, even when it assumes its mildest form. In old age and in worn-out constitutions it may be considered as incurable.

The *treatment* differs according to the variety of the disease. The mildest form, prurigo *mitis*, is benefited by a steady perseverance in the use of the tepid-bath, even when the disease is apparently for a time augmented by its employment. (*Lorry*, de Morb. Cutan. cap. iii. art. ii. par. ii.) When the bath cannot be procured, the skin should be regularly washed twice a day with warm water. We have observed much benefit to follow the daily use of the vapour-bath obtained in the manner of the Hindoos, namely, by seating the patient naked upon a chair, and after placing beside him a bucket of boiling water, enveloping his person and the apparatus within a large blanket, closely pinned round the neck, so as to prevent the escape of the hot vapour. The body should be gently rubbed by the hands of the patient whilst he remains in the bath; and when the temperature of the vapour falls, a hot brick should be dropped into the bucket to restore it. Mild soap or small quantities of the pure alkalies may be added to the water, when the body is immersed in the bath. We have not observed any advantage derived from the addition of sulphureous compounds.

In prurigo *mitis*, bleeding and active purging, followed by the internal use of sulphur and carbonate of soda or of nitre, have appeared to mitigate the itching, particularly in young and otherwise healthy subjects. If saline purgatives be employed, they should be combined with either the diluted sulphuric or the nitric acid. In prurigo *formicans* the same general means are necessary, with the addition of light tonics, such as decoction of sarsaparilla or serpentaria, or the solution of sulphate of quinia with the addition of diluted sulphuric or nitro-muriatic acid in doses of a fluidrachm, if the constitution of the patient be enfeebled or naturally weak. No benefit results from courses either of purgatives or diaphoretics.

We have little to propose respecting the general treatment of prurigo *senilis*. In most instances, the disease seems connected with a worn-out languid state of the habit, and requires the aid of a chalybeate, either natural or artificial; we prefer the former, but when it cannot be obtained, we consider the solution of the hydriodate of iron, in small doses largely diluted, as the best substitute. Some benefit has occasionally been derived from the Harrogate waters, employed internally and externally at the same time. When the itching is very severe, the warm-bath affords a temporary alleviation, and the warm sea-water bath should always be preferred to the fresh-water bath when it can be procured. When neither can be readily obtained, much benefit has followed the employment of a lotion of the bitter almond emulsion, containing one grain of the bichloride of mercury in each fluidounce of the emulsion, and one fluidrachm of hydrocyanic acid. When pediculi infest the skin, the most effectual mode of destroying them is the fumigation with cinnabar, which acts promptly and effectually; or, where this is objected to, an embrocation with one part of the oil of bitter almonds, one part of the oil of turpentine, and six parts of olive oil, will be found useful: the fumigation, however, is more decidedly useful than the embrocation, as it not only destroys the living insects, but their ova, which often escape the action of the embrocation as they lie in the rhagades.

2. **The local pruriginous affections** require a separate notice, as they have scarcely any affinity with the general diseases which we have just described. Two of them, namely prurigo *præputii* and *urethralis*, are objects rather of surgical than of medical treatment, and therefore do not require to be noticed here; and a third, prurigo *pubis*, arising solely from the presence of pediculi, is cured by whatever destroys the insects that cause it. The ointment of the white precipitate of mercury of the pharmacopœia, or an ointment made with equal parts of mercurial and sulphur ointment, answers every indication.

Prurigo podicis is sometimes a very troublesome and very obstinate disease. It generally occurs in aged persons and those of sedentary habits; and although it sometimes depends on hemorrhoids, chronic inflammation of the rectum, or ascarides, yet it appears independently of those local diseases. The itching is intense round the anus and along the perineum, extending to the scrotum, which often appears changed in colour and consistence, becoming brown, thick, and scaly. The irritation increases at night, and varies greatly, according to the diet of the patient.

Prurigo *podicis* requires a different treatment according to the degree of irritation and the habit of the patient. When it is severe, and there either exist hemorrhoids or a tendency to them, local bleeding is necessary; and this is best accomplished by cupping over the sacrum. Emollient cataplasms, composed of bread soaked in a strong decoction of poppy-heads in vinegar and water, also afford much relief to the itching at night. Rayer recommends the gelatino-sulphureous lotions proposed by M. Dupuytren, especially when the parts are excoriated by friction. We have no experience of this application, and would rely more on local bleeding, and the zinc or diluted tar-ointment; or on an ointment composed of ℥ss of acetate of lead, ℈i of sulphate of zinc, f℥iv of tincture of opium, and ℥iss of lard. We have seen much comfort derived from the daily employment of the warm hip-bath at bedtime, and the cold hip-bath in the morning. Little internal medicine is requisite: the secretions should be improved by the administration of very minute doses of calomel, namely, one-sixth of a grain combined with three grains of extract of conium at bedtime, and half a drachm of the solution of ioduret of iron, equal to gr. iss of the salt, in a large glass-full of water twice a day. In old worn-out habits, the fluid extract of sarsaparilla, in doses of a table-spoonful in half a pint of milk three times a day, has proved useful. But it must be acknowledged that this troublesome affection often resists every treatment that has been suggested.

Prurigo scroti resembles prurigo *podicis* in many particulars, and seems to originate in similar conditions of the habit. It requires nearly the

same treatment. Lotions made with calomel or bichloride of mercury and lime-water, without being filtered, have been found useful. When the disease arises in plethoric individuals from violent exercise in hot weather, nothing more is necessary than daily ablutions with tepid soap and water, regulating the bowels, and avoiding stimulant diet.

Prurigo muliebris differs little from the last-mentioned varieties, except as regards the nature of the parts affected and the sex of the patients. It is frequently connected with leucorrhœa, especially when it appears after the cessation of the catamenia. In some instances the itching and irritation about the labia and os vagina is so intolerable as to drive the patients from society, and sometimes to excite a degree of nymphomania. In such cases leeches to the vulva, and cooling saturnine emollient and narcotic lotions are indicated. On the continent much confidence is reposed on bleeding in the feet or ankles, but we are of opinion that more benefit is derived from relieving the affected parts than by any revulsive measures. Whatever local applications are employed should be frequently changed, and thus the following may be alternately used; the ordinary black-wash; the orange-wash, composed of two grains of bichloride of mercury and a fluidounce of lime-water; equal parts of the solution of the chloride of soda of Labarraque and water; and a lotion composed of two fluidrachms of liquor potassæ, a fluidrachm of hydrocyanic acid, and eight fluidounces of bitter-almond emulsion. In one very obstinate case, the writer of this article found much benefit from pencilling the affected parts with a solution of nitrate of silver, in the proportion of two grains of the nitrate to a fluidounce of distilled water, acidulated with two minims of diluted nitric acid.

It is scarcely necessary to remark that, in every local pruriginous affection, much heat should be avoided, and a firm mattress instead of a feather-bed, adopted. As the irritation is always most severe in the night, much comfort may be procured at that time by applying the sedative lotions cooled in ice. If possible, friction of every kind ought to be avoided. It is also of importance to refrain from the use of all seasoned food, aromatics, coffee, wine, and fermented and alcoholic liquors, during the continuance of the disease.

A. T. Thomson.

PSEUDO-MORBID APPEARANCES.—There are three conditions in which any tissue or organ of the body may be found, between which it is necessary to discriminate with accuracy, in order to form correct inferences in morbid anatomy. The first of these is the natural or healthy, which we find to present certain varieties either of colour or density, according to the age of the subject. The second is the abnormal or morbid, and is to be regarded as the result either of some perversion of the development of a part, or of the influence of disease upon it. The evidence of this condition is derived in the one case from some congenital malformation, and in the other from certain appearances which the texture of the part exhibits, and which vary in aspect and extent, according to the duration and violence of the disease: these are the morbid appearances. The third condition differs from both of those above-mentioned, yet in some points resembles the morbid. This condition is in general produced by causes which come into operation after death; sometimes, however, they may partially take effect a short time before death; and sometimes it may owe its rise to other causes, hereafter to be noticed, and only in action during life. The appearances which characterize this condition of the tissues of the human body may be denominated *pseudo-morbid appearances*, as being liable to be confounded with and as it were simulating those which are morbid.

Although the attention of pathologists has been a good deal directed to this subject of late years, we find but little written upon it, and the term pseudo-morbid in limited use. Dr. Yelloly, in a paper published in the fourth volume of the Medico-Chirurgical Transactions, was the first to point out that the mucous membrane of the stomach may exhibit an increased degree of vascularity under certain circumstances, independently of inflammatory action. In France, the extravagant assertions of Broussais, who, in order to establish a favourite hypothesis, pronounced every increase of redness to be indicative of inflammation, had the good effect of inducing anatomists to inquire whether other causes than disease could similarly alter the aspect of the tissues. By the researches of Trousseau and Rigot, (Archives Gén. de Méd. October and November 1826, and July 1827,) and also of M. Billard, (De la Memb. Muqueuse Gastro-intestinale,)—[see, also, Devergie, *Med. Lég.* 2d edit. i. 288, Paris, 1840,]—much light has been thrown upon the post-mortem changes which occur in the body, and which give rise to appearances often very similar to those of inflammation. We are likewise indebted to John Hunter, Allan Burns, and more recently to Dr. Carswell and Orfila for much interesting and valuable matter, which we shall presently have occasion to notice.*

It may be well to state our reasons for the adoption of a hybrid term, *pseudo-morbid*, in preference to others more generally in use. Let it be observed that we employ the term in question to denote those appearances in any given tissue which might be mistaken for the effects of morbid action in that tissue. To apply the terms *cadaveric* or *post-mortem* to such phenomena would be to limit their number and causes; whereas it will appear in the sequel that some tissues of the body may present appearances which must be regarded as *pseudo-morbid*, and which result from the action of causes operating *before* death. We are not aware that the term is employed by any writer except the author of an analysis of MM. Trousseau and Rigot's papers above-mentioned, which is to be found in the twenty-eighth volume of the Edinburgh Medical and Surgical Journal, and Dr. Christison, in his very valuable and elaborate work on Poisons. Under this denomina-

* Although distinct treatises on this subject are rare, we must not omit to state that it has received due attention in several modern works, either on morbid anatomy in general, or on particular parts of it. We need hardly refer to Andral's invaluable Treatise on Pathological Anatomy. In Laennec's work, also, and in those of Bertin and Hodgson, constant allusion is made to appearances supposed to be cadaveric or produced in the agony of death.

tion, then, we would be understood to include all appearances in the dead body which might be mistaken for morbid appearances, whether they arise from the action of causes antecedent to death, or whether they be strictly such as are now generally spoken of as *cadaveric* or *post-mortem* appearances.

In the great majority of cases, a more or less gradual diminution of the vital powers precedes dissolution. The influence of life in preserving the integrity of the membranes of the body, whether it act through the nervous system or in any other way, gradually diminishes, and a corresponding change is manifested. This is most conspicuous in the capillary circulation, which becomes impeded to a variable extent in several places, the vessels being less capable of resisting the force of gravitation. This disturbance of the capillary circulation may be noticed in almost every tissue in the body. In the agony of death, the same cause, it is natural to expect, will operate to a greater degree, and at the same time the occasional muscular contractions, which often mark the final struggle, must mechanically cause irregular distributions of the blood in the sanguiferous system. The extent to which these irregularities take place is in general proportionate to the strength of the patient (inversely), to the duration of the struggle, and in some cases, we conceive, to the degree of fluidity of the blood itself (directly). Any one who has ever watched a patient in the last stage of typhus fever will not want further testimony in favour of the accuracy of the preceding statements. The general cutaneous *hyperæmia* of the back and dependent parts indicates that the laws of gravitation have begun to operate to a much greater extent than during the state of health. (See an interesting essay by Bourdon, entitled "De l'Influence du Pesanteur sur quelques Phenomênes de la Vie." Paris, 1823.) We may also adduce the *pneumonie des agonnisans* of M. Laennec, the *engouement de position* of Andral, or the *pneumonie hypostatique* of Piorry, as additional corroborative evidence.

But even when life is in full vigour, local sanguineous determinations may occur independently of the immediate operation of disease on the part in which they appear. Thus the performance of peculiar functions may cause an afflux of blood to the particular organs; as for example, while the function of digestion is going on, we find that a marked change is produced in the colour of the mucous membrane of the stomach. Again, if any obstacle occur to the free return of the venous blood, there is in general formed a congestion of the capillary system to a greater or less extent; this is more conspicuous where the veins are destitute of valves, as in the mesenteric veins, the pulmonary veins. Hepatic disease, by compressing one or more ramifications of the vena portæ, and some forms of disease of the heart, are very frequent causes of the local determinations to which we allude.

With the cessation of life is removed all opposition to the full scope and play of gravitation and chemical affinities, the former of which was partially in operation during life. The manner in which the fluids seek the dependent parts is clearly to be attributed to the action of gravitation. In fact it has been proved to be so caused, over and over again, by the simple experiment of turning the body occasionally, so as to change the dependent parts; in this case the blood is invariably found to leave the vessels that were before lowest to seek those that now are so. Bodies being usually placed supine after death, the integuments on their posterior surfaces are uniformly found congested, but if the body be placed immediately after death on the face and abdomen, a similar congestion will present itself in the integuments covering those parts.

The effects produced by the operation of chemical affinities are apparent in the alterations in the texture, the density, and the specific gravities of the tissues: gases are evolved, new fluids are formed, and the membranes are often considerably discoloured; in short, in the action of these affinities consists the putrefactive process, whereby new compounds are formed, and the former constituents of the body almost wholly vanish. We find considerable variation in the period of commencement and rapidity of course of this process, not only as regards different bodies compared with each other, but also with respect to particular parts of the same body. The age and habit of the individual, the quantity of the fluids, the kind of death, as well as the circumstances which preceded it, the season of the year, climate, state of the atmosphere, are so many circumstances which exert a powerful influence on the rapidity of the phenomena of this process, as must be familiar to every one who has studied anatomy even in the most superficial manner.

To the action of these same chemical affinities, we think, may be fairly attributed, at least in part, a very evident cadaveric phenomenon; namely, that increased porosity of the membranes by which the contained fluids are allowed to transude through the coats of the canals or sacs which hold them. We say *increased* porosity, for it must be admitted as the result of recent experiments, that transudation may take place to a slight degree even during life. (See the experiments of Foderé on absorption; of Dutrochet; and the Observations of Bouillaud on Dropsies.) Life, then, must be supposed to operate in limiting this porosity, by preventing the action of the chemical affinities; when life ceases, these affinities come into play, and there takes place a separation of the molecules of the tissues to a degree proportionate to the extent of action of the same affinities. There is no part of the body in which we do not observe this phenomenon; it is not confined to sacs with simple parietes, but extends also to those of which the walls are compound; we observe it to take place through the coats of vessels, through the walls of any or all of the membranous viscera, and even through serous membranes.

The alterations which are produced, then, on the several organs or membranes of the body by the action of the agencies above detailed, may be stated in general to be—1. such as affect the colour of parts; 2. such as alter their density or consistence; 3. such as alter the contents of a natural cavity, as for example a serous sac, by increasing or diminishing the quantity, or altering the nature of fluid in it.

We proceed to consider these effects as they

manifest themselves in the different parts of the body, and we shall adopt the order usually followed in making a post-mortem examination, commencing with the external integument and the cellular tissue, then proceeding to the contents of each of the three great cavities, head, thorax, abdomen; and, finally, to the arterial and venous tissues.

1. **The external Integument.**—The alterations in colour which the skin presents after death, are almost the only phenomena which it exhibits liable to be mistaken for those of disease; and even they are so distinct in the mode of their formation, that any mistake must arise from a very superficial examination. Spots of various degrees of redness, and also varying in extent, are almost uniformly observable on the dead body. In general they are of a dark red, which increases in depth of colour with the length of time that has elapsed from the death of the subject. As this cutaneous discoloration is principally owing to the influence of gravitation, we find it uniformly on the most dependent parts, the occipital portion of the scalp, the posterior surface of the neck, the back, nates, posterior parts of the thighs and legs. That it is confined to the skin may be seen by cutting into the corion where the redness exists. It is moreover to be observed that this redness is vascular, and that the surface of the skin presents the appearance of a ramiform distribution of vessels. This is important, as characterizing the kind of discoloration arising from gravitation, and distinguishing it from that which may be the result of the pressure of ligatures or vestments, &c. on the surface before death; for in this latter the redness will be found to be diffused and uniform, without any appearance of vessels.

But cutaneous discolorations or lividities may occur in situations not dependent, and at a more advanced period after death, being phenomena purely cadaveric. When decomposition has fully set in, and gases are being disengaged in the stomach and intestines, the surface of the skin of the face and neck becomes of a livid colour; the superficial veins are full, and streaks of a dark colour indicate the course of most of them. This congestion Chaussier attempted to explain by attributing it to the compression of the right auricle of the heart by the diaphragm, which was pushed up by the stomach distended with gas; and he states that by producing a similar distension of the stomach artificially, viz. by the introduction of a fermenting mixture into it, he was enabled to exhibit similar effects on the cutaneous capillary system. The compressed right auricle causes in the blood a retrograde motion from venous trunks to branches, from the branches to the capillaries, which is the more easily done, as at this period the blood has to a considerable degree resumed its fluidity. To this fermentation and gaseous development may be attributable, as Chaussier further observes, the passage of pieces of food from the stomach into the pharynx, larynx, and bronchi, the passage of worms into the bronchi, nasal fossæ or mouth. (*Chaussier*, Médecine Légale, and Table des Phénomènes Cadavériques.)

2. **The Cellular Tissue.**—The subcutaneous cellular tissue is generally more or less discoloured in the neighbourhood of or immediately beneath the cutaneous discoloration. Here, however, the change of colour takes place from a two-fold cause,—the gravitation of the fluids in the vessels, as well as the transudation of the serous portion of the blood through the vascular parietes. These two causes generally reduce the subcutaneous tissue to an anasarcous condition, which of course increases with the progress of decomposition; the serous portion of the blood, too, becomes more and more tinged by the colouring matter. We need hardly refer to the common appearance of the cellular membrane under the integuments of the back, with which every student of anatomy is familiar, in proof that this is the ordinary condition of that membrane, and that too within a very short period after death, as the effect of gravitation and transudation. But as putrefaction advances, and the blood resumes its fluidity, we observe ecchymoses to form in the subcutaneous tissue, the distinction of which from the effects of contusions before death is sometimes an important task for the medical jurist, and is rendered more difficult by the fact that these ecchymoses do not seem to be formed under the influence of gravitation, being found even in elevated parts. Although it does not strictly come within the range of this article, it may be proper to mention that the following circumstances, noticed by Orfila, will assist in distinguishing these cadaveric ecchymoses from such as may have been formed by violence or otherwise before death:—1. Their situation, which will generally be found in those localities where the cellular tissue is very lax and distensible, as in the occiput, loins, eyelids, and scrotum; 2. the general evidence of an advanced stage of putrefaction presented by the dissolving condition of all parts of the body; 3. the uniformity of colour presented by these ecchymoses, which is not usually observed in those made during life. (*Orfila*, Leçons de Médecine Légale.)

Subcutaneous ecchymoses, however, may be produced by direct violence applied to the body shortly *after* death, as has been proved by experiment by Dr. Christison, and as may often be seen in the dissecting-rooms. Effusions of blood into the intermuscular cellular tissue, it is important to bear in mind, may likewise be produced by violence to the body after death. During the winter 1830–31, we had occasion to notice this fact upon bodies which, from the then imperfect state of the laws regarding dissection, were conveyed to London tightly packed in boxes from distant parts of the country. In such bodies extensive extravasations of blood into the cellular membrane between the muscles of the back were uniformly present. This fact had been likewise previously well ascertained by the happily devised experiments of Dr. Christison on the occasion of the murders committed at Edinburgh. (Ed. Med. and Surg. Journal, vol. xxxi. p. 243.)

We do not find any induration of the cellular tissue of a pseudo-morbid character; but it may be remarked, although the fact cannot have escaped the most superficial observer, as a post-mortem result, that this tissue is frequently emphysematous, and, indeed, always so after a certain period in the work of decomposition, but sometimes very soon after death, as in some low and putrid fevers, &c.

3. **The Head.**—On opening the cranium, the attention is first directed to the quantity of blood contained in the small venous trunks which are seen ramifying on the surface of the dura mater and in the sinuses. It was long ago noticed by Vicq d'Azyr, and subsequently by Marc, that the straight sinus and torcular Herophili uniformly contain coagulated blood, in consequence of the blood when fluid flowing to that dependent position. On the same principle we may expect to find the superficial veins of the dura mater more distended towards the posterior portion of that membrane. With respect to the general appearance of the dura mater, the anatomist has only to take care that he attributes a condition of hyperæmia of it, whether local or general, to its proper cause: in consequence of the fibrous character of this membrane, it is not liable to a diffuse discoloration, such as some of the other tissues are, nor do we find any alterations of its consistence which are at all likely to be mistaken for morbid ones. In fact it resists the putrefactive process for a considerable time, as do all membranes of the same nature. It is proper, however, to remember that a *hyperæmia* of this membrane may be developed in the progress to decomposition, by the disengagement of gas in the stomach, and the compression of the right auricle, in the same manner as Professor Chaussier supposed some cutaneous lividities to be produced, as already alluded to.

When the dura mater, with its adherent layer of arachnoid, has been slit up, so as to expose the visceral layer of the latter membrane, and in fact to open into the arachnoid sac, the anatomist generally looks first for some effusion between this membrane and the subjacent pia mater. We fear that in general too much stress is laid upon the occurrence of effusions between the arachnoid and pia mater. Hence what is really a natural condition is very apt to be mistaken for a morbid one; and, on the other hand, the total absence of effusion is too often regarded as indicating a state of health, when such a conclusion can be by no means constantly deduced. The interesting discoveries of M. Magendie relating to what he has termed the cephalo-spinal fluid, deserve more attention than seems to have been bestowed upon them by most practical pathologists. The principal conclusions at which he has arrived are the following:—1. That in the state of health there exists a fluid between the visceral layer of the arachnoid and the pia mater, both of the head and spine; the quantity of which is never below two ounces in the adult, and often amounts to five in subjects of large stature, and whose cranium is not of small dimensions;—that the fluid contained in the spine communicates with that in the head, and vice versâ, so as to pass freely from one cavity to the other;—and that a portion of the same fluid is found in the lateral, the third and fourth ventricles of the brain, which communicate with the space between the arachnoid and pia mater by an opening situated at the inferior extremity of the fourth ventricle, between the upper part of the spinal marrow and the valve of Vieussens. 2. That this fluid may be demonstrated in full quantity either during life, or at a short time after death; but after a period of little more than twenty-four hours it becomes absorbed, and therefore diminished in quantity, or altogether removed: if after that period sub-arachnoid effusion of this kind exist, it is to be considered either as entirely a post-mortem appearance, or the remains of the natural effusion, to which had been added a quantity of fluid, the result of morbid action. 3. That a diminution as well as an increase in the quantity of this fluid is capable of producing serious disturbance in the functions of these important portions of the nervous system. It is plain, therefore, from the above abstract of Magendie's discoveries respecting this cephalo-spinal fluid, that it would be always difficult, and often impossible, to decide whether a sub-arachnoid effusion be a natural, a morbid, or pseudo-morbid phenomenon. Unless the effusion be very considerable, and have been found very shortly after death, we cannot with certainty pronounce it to be the effect of disease. But those which are found forty-eight or seventy-two hours after death are for the most part pseudo-morbid, being caused by the transudation of the serous part of the blood through the vascular parietes, so much so that, in opening a body two or three days after death, we may invariably expect to find sub-arachnoid effusion to a greater or less extent. We conceive that a due attention to these facts connected with the cephalo-spinal fluids will sufficiently account for the surprise or disappointment which some have expressed respecting the want of coincidence between the severity of symptoms and the extent of effusion.

The degree of colour of the pia mater is often increased by the same causes which we have already enumerated as influencing post-mortem sanguineous determinations; in this case it will always be found that the other tissues within the cranium which admit red blood are similarly congested. In some cases this congestion may go so far as to produce extravasation; and if the body has lain long after death, the serum effused between the pia mater and arachnoid will be more or less tinged with the red particles of the blood. We may here remark further, that sanguineous extravasations from apoplexy, if extending into the cavity of the ventricles, will communicate their colour to the cephalo-spinal fluid, provided the natural communication of the internal cavity of the brain with the sub-arachnoid cavity be not interrupted.

With respect to the encephalon itself, it may be stated that in general (such obvious cases as apoplectic clots, abscesses or tumours being excepted) it is extremely difficult, nay, often impossible, to decide between the morbid and pseudo-morbid states of this organ. This latter state is such as manifests itself by a change in the colour and consistence of the cerebral tissue. As to colour, we find it, here as elsewhere, influenced by the quantity of fluid blood in the viscus: in the cortical substance, from its much greater vascularity, that discoloration is most likely to appear; and it is of the first moment to distinguish it from the redness of inflammation, because we find that the same colour may be the result of an active determination of blood to the brain, as well as arise from a mechanical congestion of its membranes and substance. To determine this question it will be necessary to note accurately certain collateral circumstances — the condition of the arterial and venous system of the head generally—the degree

of plentitude or vacuity of the heart, whether it afford any obstacle to the free return of the blood, or by an increase in its propelling power magnify the momentum of the columns of blood to the head—the position in which the head of the individual has been laid since death—and also whether putrefaction has begun, or the degree to which it has advanced.

The alteration in consistence, by a diminution of it, (*softening*,) is the most constant and obvious change which the brain and spinal marrow present. This softening is equally the result of disease and of the tendency to decomposition. Before proceeding to indicate the distinctions between these two kinds of softening, it may be well to notice that in the state of health different parts of the cerebro-spinal axis present a marked difference as to consistence. Thus, in the adult, the spinal marrow is softer than either the cerebellum or cerebrum; the cerebellum than the brain; both these parts softer than the pons Varolii. In the child the spinal marrow is firmer than the brain, and more resisting than in the adult.*

The morbid and pseudo-morbid softenings present many characters in common, as to situation, colour, smell: indeed, we have no sign sufficiently free from ambiguity to indicate either of these conditions with certainty: both attack the grey substance most frequently, and before the white; both exhibit the same varieties and shades of colour —with this exception, that in the morbid softening we often see the affected part of a bloody tinge, arising from a slight sanguineous effusion: sometimes a purulent infiltration is found, which is obviously decisive. In the extent of these two forms of ramollissement, we have a more certain indication of their cause; the pseudo-morbid will generally be found to pervade the whole cerebral mass, varying perhaps in degree according to the above-mentioned scale of natural variations of consistence, but the morbid ramollissement is almost invariably circumscribed. We say *almost*, because a morbid ramollissement has been met with of unusual extent, occasionally in the adult, but more frequently in the new-born infant. A state of general ramollissement of the brain is met with in cases of general anasarca, and differing very much from morbid softening. It arises from the infiltration of the brain by the fluid effused in the cranium and beneath the arachnoid. It can be produced in the dead body by injecting water through a small opening made in the head; the whole fluid injected will not be found in the serous membrane. (*Gendrin*, Hist. Anat. des Inflammations, vol. i. p. 188.)

M. Orfila suggests the propriety of pronouncing with caution on a morbid ramollissement merely from its locality being defined, because the cadaveric softening does not begin at the same time in all parts; the fornix, septum lucidum, and walls of the lateral ventricles, being the situations in which it first shows itself.

The spinal marrow is remarkable for the rapidity with which it softens. Every anatomist knows that in order to dissect that organ satisfactorily he must obtain it from a body quite recently dead, and that even then a short exposure to the air causes a rapid diminution in its consistence. The internal grey substance seems more prone to this diminution of consistence than even the white, and hence the great diversity of opinion among anatomists respecting its exact form and characters in a state of health. However, in this organ there does not appear, so far as we at present know of its morbid states, any difficulty in distinguishing the pseudo-morbid softening from that which is caused by disease; for the circumscribed locality of the latter, with the augmented vascularity of the surrounding portion, and slight sanguine tint of the softened part, will in general be sufficiently characteristic. We are not aware that such a decidedly pathological general ramollissement of the cord has been found as we have noticed in the brain.

4. **The Thorax.**—On opening the chest in the usual way, the membrane of the pleura first attracts notice. After the lapse of some time from death, an effusion is invariably found in this serous sac, which is liable to be mistaken for a morbid one. The subserous cellular tissue and the pulmonary substance being abundantly pervaded by fluids, it follows that a transudation of them must necessarily occur after a certain period, and of course they will be collected into the sac of the pleura. The bloody colour of this fluid, its serous character, the absence of any organizable matter such as serous membranes are prone to secrete, are sufficient to prove that this is not a morbid phenomenon; moreover, it will seldom be found except in a body examined at least forty-eight hours after death, and its quantity will be in proportion to the condition of the body as to decomposition. Sometimes, but rarely, gaseous effusions take place in the pleural sac; they are in general complicated with old pleuritic effusions, and result from their decomposition, thus constituting one of the species of pneumothorax described by Laennec. Whether this disengagement of gas takes place before or after death is not easily determined; probability is in favour of the latter, but the experiments of Gendrin seem to indicate the presence of a variable quantity of gas in the chest in very acute pleurisies, appearing just when the inflammation seems to have arrived at a certain degree of violence.

In the mucous membrane which lines the air-passages, from the larynx and trachea to the minutest bronchial ramification, discolorations occur from various causes, which are extremely likely to deceive even a practised eye. In the larynx, trachea, and larger bronchi, this discoloration is not so variable. We here find a passive hyperæmia from the gravitation of the blood, in which case the mucous membrane is only partially congested. We also find here a congestion from obstruction to the circulation generally, dependent on disease of the heart; but in the minute bronchial ramifications we find not only the influence of gravitation or transudation after death producing alterations in the aspect of the membrane, but likewise these causes are apt to take effect in the

* *Orfila*, Exhumations Juridiques, tom. ii. p. 225. Such is undoubtedly the case at the usual period after death when post-mortem examinations are made. But we are disposed to think with Calmeil, that immediately after dissolution the spinal marrow is of firmer consistence than the brain. The Essays of this author on the Anatomy and Physiology of the Spinal Marrow are well worthy the reader's attention. Vid. Journal de Progrès des Sciences Méd. tom. xxxi.

struggle of death, or even some time before death in very debilitated persons. The progress of putrefaction in general produces a very marked and diffuse brown colour of the mucous membrane, much more intense in the smaller tubes. To be able to decide upon any one of the above species of hyperæmia of the bronchial membrane will require a careful consideration of coexisting circumstances. In the latter instance the general condition of the pulmonary and the other tissues as to their state of preservation, will materially assist; in the other cases the injection is ramiform, and the membrane does not appear so uniformly dyed, the redness being chiefly limited to dependent parts; and the state of the heart or great vessels will assist further in deciding upon the true nature of the redness. These circumstances will direct us in discriminating any of these different forms of redness not only from the others, but also from that which is produced by inflammation. Inflammatory redness, it should be remembered, is often accompanied with some secretion, either a viscid and adherent mucus, or a pseudo-membranous exudation, or even purulent fluid, all which are unequivocal proofs of the morbid nature of the colour of the membrane.

In examining the pulmonary tissue itself, we experience considerable difficulty in distinguishing between its pseudo-morbid and morbid conditions. We can say with confidence, from tolerably extensive opportunities for studying the subject, that there is no one point in morbid anatomy more difficult to pronounce upon with certainty, than whether a hyperæmia of the lung be inflammatory or not. Every one must have experienced how unsatisfactory are the signs of the second stage of pneumomia — the *engouement* of authors. It is obvious that this difficulty is greater the longer the period which may have elapsed since the death of the subject. It however rarely happens that a patient dies in the first stage of pneumonia; most frequently we find that the disease has in one portion of the lung advanced to its second stage (*red hepatization*), and very frequently the third stage (*grey hepatization*) is exhibited in the same lung along with the two preceding. Where either of the forms of hepatization exists, there can be little doubt as to the nature of the congestion in any other part of the lung. Moreover, we may remark that the inflammatory congestion affects the upper as well as the dependent parts. The following observations from Andral will show how he estimated the difficulty of laying down any distinction between inflammatory and the pseudo-morbid hyperæmia. "It is," he says, "in the lungs as in the intestines, where a local accumulation of blood may be found in the dead body, which has had no share in producing any of the morbid phenomena observed during life; but was formed during the last moments of existence, or after life ceased altogether. Hence it follows that the existence of a simple congestion, especially when it occupies the most dependent portions of the lung, is not sufficient to prove that a process of irritation or inflammation had been going on there during life. Does an alteration in the consistence of the part afford a more certain criterion to judge by in such cases? For a long time I was of opinion that when the lung was red and gorged with blood at its posterior portion, and at the same time was softer and more easily broken down than natural, it was a proof that the hyperæmia was caused by inflammation; but I have since altered my opinion, and am now convinced that whenever the sanguineous congestion is so great that the lung contains a larger proportion of blood than of air, the pulmonary parenchyma is invariably soft and friable. The reason of this fact will readily be understood if we reflect that, when the lung contains a much larger proportion of air than of blood, the parietes of the bronchi, when pressed by the finger, press in their turn on the compressible fluid they contain, and in this way, by compressing or expelling the air, retire before the pressure of the finger, and so escape being ruptured. But when the lung contains a larger proportion of blood than of air, the former fluid being almost wholly incompressible, the pulmonary tissue cannot recede from under the finger, and is therefore easily ruptured." (Andral's Pathol. Anatomy, by Townsend, vol. ii. p. 508.) And in another section he remarks, "as the anatomical characters of the hyperæmia are precisely the same in both these cases, it follows that, in this instance at least, the true nature of the lesions found on dissection can only be known by the nature of the symptoms observed during life." (Op. cit. vol. ii. p. 509.)

We can hardly suppose it possible that gangrene of the lung and any post-mortem congestion of it could be confounded together. The peculiar smell from a gangrenous spot is a certain indication of its true nature. However, if any condition do appear closely to resemble gangrene, by carefully washing the suspected portion of lung in clean water we shall in general succeed in exhibiting the sound pulmonary texture.

In the pericardium the signs of disease are so very obvious that we know of no phenomenon which that membrane can present which could be considered pseudo-morbid. There is found, however, in its cavity, after a certain time, a sero-sanguinolent effusion in small quantity, which, like a similar one above noticed in the pleura, is to be regarded as a cadaveric result. (See HYDRO-PERICARDIUM.)

Except after the lapse of a considerable time from death, we have never seen any post-mortem condition of the substance of the heart which could be mistaken for a morbid one. We not uncommonly meet with softening of the muscular texture of the heart; and this may arise from so many different causes, that Andral has enumerated six varieties of it; with any of these may be confounded a true cadaveric softening, which, however, generally does not appear for a long time after death. The best criterion of the true nature of a softening of the heart's parietes may be formed from the state of the internal membrane; if that membrane be healthy, or do not partake in the diminished consistency of the heart's parietes, then the great probability is in favour of this condition being the result of disease. But when the internal membrane is of a deep red colour, and is more or less softened, while at the same time there is no appearance of any lymph or other product usually resulting from inflammatory action, then we consider it impossible to determine with

certainty to what cause the softening is to be attributed. In some instances the blood has been known to transude through the walls of the heart, and form ecchymoses either between the fibres or on the external surface. Such ecchymoses will want the regularity of form which those formed during life would possess, and rarely, if ever, take place except in an advanced stage of decomposition. We have twice seen numerous ecchymosed spots on the hearts of patients who died of purpura hemorrhagica; but these should be considered as morbid, and attributable to the same cause as the cutaneous ecchymoses.

The internal membrane of the heart often presents an obviously pseudo-morbid alteration in its colour. When the examination of a body does not take place for forty-eight hours after death, or in very warm weather for a longer period, we may invariably expect to find this membrane of a red colour to a greater or less extent. That portion which lines the dependent parts of the cavities will always be found so, and to a greater degree than the rest, because the colouring matter sinks through the coagulum so as to come immediately in contact with the internal surface of the heart; and this will account for the fact, that except at a very advanced period in the cadaveric decay, this redness generally appears in patches, and those most intense which are most dependent. A precisely similar redness will occur under circumstances which can leave no doubt that it took place during life; but as this subject is closely connected with the appearances of the internal coats of arteries, we shall defer any farther remarks upon it till we come to that section of our article.

The fibrinous masses which are almost uniformly found in the cavities of the heart are not to be considered in every instance as morbid productions, as the older pathologists thought; in general they are formed after death, or immediately before it, and merely form the natural disposition of the fibrine to assume the solid form. However, some of these coagula have been found organized, some containing pus, others with pieces of bone on them or in them; whence we must conclude that these fibrinous masses may be formed before death, and produce considerable disturbance of the circulation.*

5. **The Abdomen.**—Of all the serous membranes, the peritoneum is most liable to *morbid* effusions. But in this cavity, as well as in that of the pleura, we generally find a post-mortem effusion after thirty or forty hours; which, like that of the pleura, is in general coloured by more or less admixture of blood. This fluid will always, except it be in very great quantity, be found in the pelvic portion of the peritoneum. In the serous membrane itself, we know of no pseudo-morbid appearance likely to occur, except we name that softening produced by contact with the acid contents of a perforated stomach, which we shall presently notice more fully. The discoloration arising from contact with the gall-bladder is too evident to be mistaken for disease.

In examining the exterior of the intestinal tube as the intestines lie in the abdominal cavity, we observe appearing through the serous coat vascular ramifications more or less numerous and more or less filled with blood. Here we observe well illustrated the effects of gravitation on the blood within the vessels of the intestines; those coils which are lowest, namely those which hang into the cavity of the pelvis, always presenting the deepest colour, and also the most depending portions of all the parts of the canal.

There is no membrane of the body which presents pseudo-morbid coloration arising from so many different causes, as the gastro-intestinal mucous membrane: we speak now of the colour which results from particular distributions of the blood in its vessels. In the first place, we may notice that the *act of digestion* produces an increased degree of redness of the mucous membrane of the stomach as well as of the small intestine. The effect produced by digestion on this membrane has been well noticed by Gendrin; he says that the membrane becomes of a rosy hue, deeper in young than in old subjects; and that it is owing to the action of this function may be very well inferred from the fact that only that portion of the membrane is coloured which is in contact with the chymous mass. It is also remarked round the portions of digested matter which are found in the lower part of the small intestine. It appears, too, that the degree of colour depends very much upon the quality of the food, being less intense when the food is of a bland nature. This has been proved upon two dogs, to one of which milk only had been given, to the other an equal quantity of rich broth highly seasoned; the mucous membrane of the latter was of a deep red colour, while that of the former was very slightly altered. Fasting also has the effect of altering the colour of this membrane, giving it a rosy hue in its whole extent; in this way differing from the effects of digestion, which produces only a partial colouring.

A third cause of alteration of colour results from "the passive hyperæmia," to adopt the language of Andral, "which has always a tendency to take place in the last moments of life in the parts abounding with capillaries." In this case the colour is generally of a darker hue, and the greatest quantity of blood is found in the vessels of the depending portions of the intestines.

Any obstacle to the free return of the venous blood, whether it reside in the liver, or from compression of the vena portæ itself, or whether it is to be found in the heart, will produce increased vascular injection of the mucous membrane; the blood in such cases will be of the venous kind, and the injection extensive, and even universal; varying, however, according to the period before death at which the obstruction commenced.

Such are the circumstances which operate before death in producing pseudo-morbid colouring of the mucous membrane. In the true inflammatory redness, there is generally some degree of thickening of the membrane, as well as a viscid mucous secretion in variable quantity. The redness, too, is not affected by position, being equally great on the upper as in the depending portions, and in a more advanced stage of the inflammation there may be lymph or purulent matter.

* Dr. Harty has given a very elaborate narration of the symptoms of two cases, which in his opinion were produced by these so-called polypi of the heart. Dub. Med. Transactions, vol. i.

After death, we find the blood accumulating with greater rapidity, and in a more marked manner in the depending parts. This phenomenon may be observed as to the mode of its occurrence, by removing a coil of intestine, tying it at each extremity, and hanging it up; after some time the blood will be seen to leave the upper part, and accumulate in the lower portion of the intestine. If there be much blood in the capillary system of the mucous membrane, we observe another cadaveric phenomenon, after the body has lain for some time: the mucous membrane, and of course the villi, are gorged with blood, which presently begins to ooze out upon the surface, and to pass into the cavity of the intestine. This we lately saw well exemplified in the case of a young gentleman who died of fever, and whose body we could not obtain permission to examine till five days after death. All the upper portion of the small intestine was free from sanguine congestion, but that part of it which lay in the pelvis was found to be of a dark red hue externally; the mucous membrane being gorged, especially at its inferior part, and the cavity of the intestine full of fluid blood. This phenomenon is easily explained if we consider how freely the blood passes from the large mesenteric veins to the villi, which moreover, from the researches of Ribes, appear to contain more veins than arteries; it is also further accounted for by the great facility with which an intestine may be inflated by blowing air into its principal venous trunk. Contact with the spleen produces a redness of a different kind, being more of a uniform stain or tinge of the membranes in its vicinity. This obviously arises from transudation of the blood from this vascular body through its coats. After a certain period we find the blood to transude through the coats of the larger vessels of the stomach and intestines so as to produce a more or less continuous stain, or extravasation of blood in the cellular membrane on each side of the trajct of the vessel. This appearance must be familiar to every one who has examined a stomach in an early stage of decomposition; the stain is distinctly visible on the mucous surface, and may also be noticed on the peritoneal surface. The period at which this transudation may take place will very much depend on the season, the temperature of the room, and perhaps the state of the blood.

There are two other causes of discoloration which it is well to remember, although the appearances they produce may not be very apt to be mistaken for morbid ones. One of these is the presence of gases in the cavity, which may alter in various ways the colour of the blood collected in the coats of the intestine. The action of the bile too, by soaking into and combining with the mucous membrane, produces a very obvious change in its colour, and this may even extend into the stomach. There is a third cause of discoloration resulting from the action of the gastric acid on the blood, which we shall notice more fully after considering the other effects of that acid.

In inspecting the alimentary canal, we should not neglect to observe accurately the nature of its contents, for sometimes some coloured fluid may be found among them which may impart its colour to the membrane. Dr. Christison quotes a case in which a suspicion of poisoning had arisen from the inspector hastily referring the altered colour of the inner membrane of the stomach to inflammatory action. It was ascertained that the deceased was in the habit of taking a strong infusion of corn poppy, (*papaver rhœados,*) which, when administered to dogs, produced appearances identically the same. The inference was obvious. (Vide Christison on Poisons, p. 121.)

It will thus appear, that in attempting to form a judgment as to the precise nature of any coloration of the alimentary mucous membrane, there are numerous sources of fallacy which it is important to avoid. It is in the stomach that most of these pseudo-morbid appearances occur, but many of them likewise are to be met with in the intestines. They may be classed as follows: 1st, those which are produced antecedent to death, and 2d, those which are strictly post-mortem or cadaveric. Under the former are comprehended, 1, those produced by the stimulus of digestion; 2, those resulting from long abstinence; 3, the result of passive hyperæmia toward the close of life; 4, such as arise from a disturbed state of the circulation owing to a retardation in, or obstacle to, the free return of the venous blood. Under the cadaveric may be enumerated, 1, that arising from post-mortem hypostasis, which is sometimes accompanied with cadaveric hemorrhage; 2, that produced by contact with a vascular body like the spleen; 3, those stains or streaks resulting from transudations of the blood through the coats of the larger vessels, more especially of veins; 4, that produced by the action of gases evolved into the cavity of the intestine, upon the blood contained in its vessels; 5, that from imbibition of the bile; 6, that from contact with some coloured fluid in the intestine forming part of the ingesta; and, lastly, that produced by the action of the gastric acid, of which we have yet to speak.

Attenuation or thinning of the mucous membrane is occasionally met with as a morbid phenomenon. We sometimes, however, find it caused mechanically by a continued distension of the tube. Thus Billard relates a case in which he found a mass of lumbrici in a portion of small intestine, which was so distended by them that it almost equalled the cœcum in volume, and its wall was so thin as to permit the worms to be seen coiled up in its interior. We lately examined the body of a young girl, in which the cœcum was distended with fæces to such a degree that it extended across the upper outlet of the pelvis to the left iliac region. From the excessive attenuation of the wall of the intestine, the fæces were distinctly visible through it.

Softening of the mucous membrane is an alteration of texture which equally takes place under the influence of morbid causes as of others of a different nature. Nobody denies the existence of softening of the gastro-intestinal mucous membrane consequent upon inflammation; but it may reasonably be doubted whether it arises from that cause so frequently as has been supposed. Neither can this alteration of consistence be considered as a frequent result of the putrefactive process, for unless the membrane be exposed to air, we find that it softens slowly. Andral has

found its consistence unimpaired eight or ten days after death, and in bodies which exhibited abundant signs of advanced putrefaction. Even when exposed to the air it softens slowly, as Billard did not perceive any change till the sixth day of the exposure of a portion of mucous membrane, and in a situation where the sun's rays could exert their full influence upon it. Hence we may with reason reject putrefaction or decomposition from the list of causes of this alteration, seeing that the majority of post-mortem examinations take place within forty-eight hours after death.

To John Hunter we are indebted for the first notice of what must be considered a very important fact, viz. that in the body of an individual dead soon after digestion has commenced, the mucous membrane of the stomach, the great end especially, may be found dissolved, and even the wall of that viscus perforated, and this through the solvent power of the gastric juice, "that menstruum which the stomach itself has formed for the digestion of food." (Hunter's Animal Economy, p. 231.) Without inquiring into the grounds on which so many subsequent writers or experimenters attempted to refute or deny Hunter's hypothesis, we shall content ourselves with referring the reader to Dr. Carswell's very able paper on this subject, (see Edin. Med. and Surg. Journ. v. 34, p. 282,) in which he will find the opinions of Jæger, Laisné, Gairdner and others, fully discussed, and pass on to state the facts which appear fully to establish the original opinion of the great British physiologist. The first circumstances in favour of this opinion are those related by Hunter himself, viz. the fact of having found a solution of the stomach in two persons killed suddenly and shortly after having taken food; the frequency of the solution in fishes, which generally died of violence and with the stomach full, and in other animals killed violently and during digestion.

Spallanzani, Adams, Cooper, and Carlisle afterwards confirmed these experiments. Some failures, however, occurred in the attempts to produce this phenomenon at pleasure in animals, and hence the confidence of subsequent experimentalists was somewhat shaken. Some observations strongly corroborative of the Hunterian doctrine were published by Allan Burns; he found the stomach dissolved and perforated, and not only this, but every viscus with which the fluid that escaped from the stomach came in contact was also softened in its walls; and as a still further confirmation, he observed, on examining the body two days after his first inspection, that the solution had extended considerably. Recently Dr. Carswell, in the paper above referred to, has fully succeeded in proving that this softening takes place in healthy animals killed during digestion, and that, in whatever part of the stomach "this function was going on most actively, or an accumulation had taken place of the products of secretion, there the organic alterations had also occurred." Finally, a case has occurred to Dr. Sharpey, as related by Dr. Christison, precisely analogous to that of Mr. Burns. "On proceeding to open the body of a child for the purpose of dissecting the nerves, he remarked that the stomach was perforated and gelatinized, but the adjoining parts uninjured. He then sewed up the body in order to show the appearances to some of his friends next day. By that time the peritoneal surfaces of the spleen and left kidney were found much softened and pulpy where they lay in contact with the hole in the stomach." (Christison on Poisons, p. 127.)

Such, then, is the evidence upon which we would attribute a form of softening (and perhaps the most frequent) of the mucous membrane of the stomach, to the action of the gastric juice, and it may be added that this action may go on to produce a perforation of the wall of the stomach. The softening is generally observed at the most depending part, most commonly the great sac: here the membrane appears like jelly, yet hardly so firm. "When raised between the fingers the coats crumbled to pieces like a recent pseudo-membrane," and often the serous coat is similarly softened. The only alteration of colour in the mucous membrane is that of being rendered rather whiter than the natural hue. The perforations resulting from this cause of course vary in extent according to that of the softened tissues; we find them, therefore, of all sizes, sometimes so great as to involve a considerable portion of the stomach. The margins appear half dissolved, fringed, and generally formed of the serous membrane, and for a considerable distance round the mucous membrane is gelatinized. Moreover, as has been first noticed by Dr Carswell, the blood-vessels distributed on the softened parts and also on every part which had come into contact with the fluid, were altered in colour, so as to form brownish, brownish black, or pure black arborescences. When the fluid could not come in contact with the membrane, the vessels exhibited their natural colour. It may be stated further that the fluid found in these stomachs at once reddened litmus. In the instances of this form of perforation which have occurred in the human subject, no symptoms whatever of gastric disease were present before death, the patients having died of disease of some other organs or by violence. Thus, according to an abstract which we take from Dr. Christison's work, it has been found in women who died of convulsions after delivery, in children who died convulsed or of hydrocephalus, after death from suppuration of the brain both idiopathic and traumatic, from diseased mesenteric glands, from nervous fever, and after sudden death from fracture of the skull and hanging.

The softening of the mucous membrane thus formed is to be distinguished from that which is the result of morbid irritation during life, as well as of that produced by the introduction of irritant poisons. Cruveilhier has described a condition of this membrane in the stomach of children, which he calls "*ramollissement gélatiniforme.*" This softening, like that above described, extends to the other coats of the stomach, and even causes perforation. In short, this affection described by Cruveilhier has the strongest possible resemblance to the pseudo-morbid softening of Hunter; but the evidence adduced in favour of its morbid character is derived from certain symptoms supervening a short time before death. We know of no means whereby we can distinguish between these two alterations, except, perhaps, the dark colour of the blood contained in the vessels of the softened part,

which, if the alteration described by M. Cruveilhier were the effect of morbid irritation, would not be likely to occur. On the whole, however, we are strongly disposed to the opinion that the *ramollissement gélatiniforme* of Cruveilhier is a pseudo-morbid phenomenon, and identical with that caused by the action of the gastric juice.

In a true pathological softening there are uniformly present some additional signs of inflammation; thus, we sometimes have redness of the membrane, and generally an increased opacity and a thickening of the submucous tissue; and it may be indifferently found on all parts of the stomach, even where the gastric juice could not come in contact with it; moreover, here likewise we have not the black discoloration of the blood which is a remarkable character of the softening by the gastric juice.

The perforation which results from this softening must be distinguished from that caused by inflammation or by rupture. The existence of signs of inflammation in the serous membrane would be unequivocal evidence; but sometimes the perforation or rupture occurs at too short a time prior to death to allow of the production of peritoneal inflammation, in which case the appearance of the margin of the opening, the state of the surrounding membrane, and of the submucous tissue, will assist in forming a conclusion.

We have alluded to the effect which the gastric fluid produces when brought into contact with the blood in the vessels of the stomach. The effect is nearly similar to that produced in the case of poisoning by acetic acid, related by Orfila in the Annales d'Hygiène for July, 1831, namely, a black or brownish black discoloration of the blood, without affecting the coats of the vessels. In the instance under consideration, however, the discoloration is not so extensive as in that of poisoning by the acid, the quantity of acid in the gastric juice being so small. But we sometimes meet with a brownish black discoloration from morbid action, which may be distinguished chiefly by the fact of its occupying the villi of the membrane, and by the gradation through which the colour passes from red to brown, and from brown to black; to which we may add that the discoloration by the gastric juice is most conspicuous in the large trunks. The absence of all appearance of transudation, as well as the state of the other tissues, will sufficiently indicate that the black colour is not caused by putrefaction.

In the parenchymatous viscera of the abdomen there are no pseudo-morbid appearances worthy of notice; they are chiefly such as are produced by mechanical obstacles to the free course of the blood, or such as are caused by the operation of the principle of gravitation. In some bad states of the blood the liver and spleen have been found softened in their texture to such a degree that they almost appeared to be thus altered by putrefaction; however, in general, the effect of putrefaction is to diminish the size of those organs, while the reverse often takes place in the case to which we allude.

6. **The Blood-vessels.**—It is not uncommon to find considerable vascularity of the cellular membrane forming the external investment of arteries. The minute vessels ramifying in this tissue, called vasa vasorum, are minutely injected, and form beautiful arborescences freely anastomosing over the surface of the arterial tube. These often are produced as a mere mechanical effect, or as the result of gravitation. The alterations of colour which the internal coat of arteries exhibits deserve particular attention. Every one must have observed that if an artery be slit open, its coagulum or blood removed, and its inner coat exposed to the air, it quickly acquires a bright red colour. Again, if the blood remain fluid for some time after death, if its fibrine be less contractile than in the healthy state, the inner coat of the arteries will be generally found to be deeply coloured. In examinations made when putrefaction has fully set in, a similar colouring of the same tissue will uniformly be seen. Again, if a coagulum exist in an artery, and the colouring matter have sunk to its most depending part, that portion of the inner coat will be coloured which is in contact with the colouring matter of the clot. Finally, by inclosing some blood in an artery, and keeping it there by ligatures, we are able to produce a red colour in its internal membrane. Such are the different ways in which a red colour or stain of the inner coat of arteries may be produced, very similar to that which is the first indication of inflammatory action in it. In veins similar discolorations, and from the same causes, are observed and in them those arising *post-mortem* take place much more quickly than they do in arteries. The red colour of the inner membrane of either arteries or veins can be but little depended on as a sign of inflammation; nor, indeed, can we derive any conclusion from it at all unless it be accompanied with an albuminous exudation or other unequivocal product of inflammatory action.

In the preceding detail of the various pseudo-morbid alterations which are to be met with in the principal tissues of the body, our design was, not to exhibit to the reader the difficulties in the way of forming a correct estimate of the condition of any structure, but to convince him, and in the most practical way, of the necessity for and utility of observing great caution in deciding upon the presence or absence of disease. We shall bring this article to a close by stating a few conclusions suggested by the consideration of the subject, which may serve as useful directions in making or recording post-mortem examinations.

1. Before proceeding to examine a body, the inspector should invariably ascertain, with as much accuracy as possible, the length of time which may have elapsed since the death, and it should be noted in the record of the inspection. The neglect of this has rendered many apparently valuable cases, noted in some of our standard works, utterly inconclusive. We allude more especially to cases in which serous effusion has been found round the brain or spinal marrow. 2. The reporter of post-mortem inspections should in no case content himself with merely stating what he conceived to be the state of a tissue, as, for instance, "*that such a membrane was inflamed*," but he should be careful to note, as clearly and as concisely as may be, the appearances which presented themselves, and any concomitant circumstances calculated to unfold the true nature of those appearances, whether morbid or pseudo-morbid. This

precaution need not, however, preclude any remarks as to the impression conveyed at the time of examination, but it is obvious that it will have the advantage of recording a plain statement of facts, from which each reader may have equal means of deriving a conclusion. 3. There are some points respecting the examination of certain parts worthy of attention. In every case of suspected disease of the spinal marrow, the spinal canal should be opened before the head, in order to form an estimate of the precise quantity of fluid that may happen to be effused. The advantage of this is apparent from what we state respecting the free communication between the two portions of the cephalo-spinal fluid. The brain should not be removed from the cranium until the ventricles have been examined, that as little as possible of the fluid may escape. Of course this is only applicable where the head is opened before the spine. As to the manner of opening the head, we have generally preferred to do so by sharp and strong blows of a hammer, so as to crack the skull round, the head being supported by the other hand, and not placed upon so unyielding a fulcrum as a table or block. We have found this method preferable to that of sawing, which, we conceive, disturbs the parts more, and, unless the saw be very sharp, is always extremely tedious; not to mention the difficulty of preventing the saw from injuring the dura mater, or even the substance of the brain itself.

R. B. Todd.

PSORIASIS.—The term *psoriasis* (scaly tetter; dartre squameuse,) from ψώρα, a scab or itch, was first employed by Dr. Willan to denote a cutaneous disease, which consists essentially in a greater or less degree of inflammation of the rete mucosum and contiguous surface of the cutis; and in the secretion of an unhealthy epidermis, forming itself into scales which exfoliate, and are renewed with greater or less rapidity. The natural transpiration through the affected parts is almost completely interrupted, and its place supplied by the exuberant growth of a morbid cuticle. Psoriasis is so closely allied to lepra that some writers (*Plumbe*, On Diseases of the Skin; *Duffin*, in Edin. Med. and Sur. Journ. 1826, on Squamous Diseases.) have proposed to conjoin them under one head, which in a practical point of view would be attended with no inconvenience. Both are well-marked scaly diseases, and the difference between them consists in the more perfect circular regularity of lepra, its inflamed margin, raised scaly circumference, and usually depressed centre; while the outline of the patches of psoriasis is irregular, and their centre rather elevated than depressed. Yet the connection between the two diseases is so intimate, that we sometimes observe both forms of eruption in the same individual; spots of lepra being intermixed with the more irregular and extended patches of psoriasis.

The elementary character of psoriasis is a scaly surface with inflammation of the subjacent vascular tissue; but to these are generally superadded the formation of fissures and excoriations, discharging a thin fluid, which concretes into crusts, intermingled with or formed upon true scales; and in severe and protracted cases there also occurs overgrowth of the cutis, which acquires unnatural thickness and solidity. This affection is attended with heat and itching, which, although seldom altogether absent, become at times more intense and distressing: during the exacerbations the inflamed skin flushes with heat, and swells up into ridges like an erectile tissue.

Psoriasis varies much in the rapidity of its progress: it generally appears first in the form of small, red, shining spots which become covered with scales; and under these other scales are formed, while the first loosen and fall off. Thus the scales thicken, the spots multiply, enlarge, coalesce one with another, and form large patches. In other instances of this disease, considerable portions of the integument are affected at once, becoming rough, harsh and chopped. Psoriasis is usually preceded by languor, lassitude, and loss of appetite: and is accompanied in its early stage by more or less of febrile disturbance, which is always most strongly marked in those cases where the disease is suddenly developed. It is very often periodical in its attacks, disappearing and recurring with marked regularity at certain seasons of the year. In the case of a lady, whose leg has for many years been affected with a large patch of *psoriasis inveterata*, the disease uniformly disappears during pregnancy, leaving a pale, wrinkled surface similar to the scar of a burn.

Causes.—Psoriasis is not generally believed to be contagious; but Dr. Willan, (*Bateman*, Synopsis, p. 38,) it appears, had observed *psoriasis guttata* to occur among the children of the same school or family at the same time: and we remember to have been consulted by two ladies having this disease on their necks, who were impressed with the belief that they had received it from their female attendant. Its hereditary nature is generally admitted; and several instances in proof of this opinion are known to us. Psoriasis is more frequently seen among the lower than the upper classes of society, and oftener among females than males, occurring especially during disorder of the uterine functions, as in chlorosis and after parturition. Persons of a full habit and dark complexion are most subject to this disease; and a distinct tendency to it is indicated by a dry and husky state of the skin, with languor of the circulation. It is more especially a disease of cold climates, and its occurrence is much promoted by the keen, dry winds of spring, and the sudden alternations of temperature which take place both at that season and in autumn. Hence it has been observed to recur particularly at these periods for successive years, and to be then most aggravated; but we have known psoriasis to be most severe during the heats of summer.

Various occasional causes appear to give rise to this disease; such as chilling the stomach by large draughts of cold water while heated, (*Falconer*, Memoirs Medic. Soc. London, vol. iii,); the sudden exposure of the body to cold after violent exercise, acid and indigestible substances taken into the stomach. In children psoriasis appears sometimes to originate from the irritation of dentition; and in adults it has been observed to arise during great mental anxiety, grief, and apprehension (*Bateman*, Synopsis, p. 38,)—most probably from the influence which these states of the mind exert over the digestive organs. There is reason

to believe that both gout and urinary calculus are connected with psoriasis, not as causes, but concurring consequences of the same disordered condition of the stomach and bowels. Numerous local irritations are productive of psoriasis affecting the hands and arms, as in washerwomen, bakers, and others.

Dr. Willan* has mentioned that both *psoriasis guttata* and *psoriasis diffusa* are sometimes the sequel of *lichen* and *prurigo;* and we recollect an instance where *psoriasis inveterata* appeared to have been the consequence of *eczema rubrum*. We have observed also the disease last named degenerate under our eyes into *psoriasis guttata*.

Psoriasis has been divided by Dr. Willan into numerous species, of which only four deserve particular consideration; the rest being regarded as mere varieties, for which a brief notice will suffice.

1. **Psoriasis Guttata,** (drop-like scaly tetter.) This appears in the form of irregularly shaped spots, some no bigger than a pin's head, others nearly as large as a sixpence; which multiply, extend, and coalesce into patches, all of them covered by white glistening scales, excepting those in the face, where they appear merely as red spots, rough and slightly elevated. It is seldom attended with much inflammation of the skin. Its type is sometimes acute, at others chronic; the former is most frequent in children, in whom it occasionally overspreads nearly the whole body in a few days; the latter is usual in adults. When the progress of *psoriasis guttata* is rapid, it is always accompanied by general feverish disturbance, and in many cases preceded by muscular pains. It appears most frequently in spring, and sometimes recurs annually at that season for several successive years. This is the most common form of psoriasis, constituting, according to Rayer, (Maladies de la Peau,) three-fifths of all the cases which are met with.

2. **Psoriasis Diffusa,** (diffuse scaly tetter.) The character of this species is considerably more inflammatory than any of the others, and it is more nearly allied to impetigo and eczema; indeed Alibert has described one form of it under the name of dartre squameuse humide.† The skin affected by this eruption is much more hot, red, and tender, more frequently presents fissures and excoriations, and is much less closely covered with scales, which differ from those of the foregoing species in being occasionally of a brownish tint, more irregular in their form, and placed more edgewise on the surface. Diffuse psoriasis sometimes appears at once over a large extent, the skin becoming harsh, cracked, red, and scaly: at other times its progress can be traced from the formation of minute, elevated spots, covered with distinct scales, which after a time are connected by the inflammation of the intervening spaces; these in their turn become scaly, and the whole is at length changed into one continuous eruption. Again, in other cases, the disease appears in small separate patches, which may remain distinct, but are also apt to extend and coalesce, acquiring ultimately the characters just described. The cuticle becomes rent into fissures, which discharge a thin, serous, and sometimes bloody fluid, while the cutis, which is always more or less turgid from inflammation, at length suffers a real overgrowth. The development of this disease is usually attended with constitutional disturbance, which is afterwards maintained by the continued irritation of the inflamed skin. The heat and itching are often very troublesome, and any additional excitement from increased temperature, or the friction of the clothes, produces a distressing aggravation of the symptoms. In children this is particularly remarkable, for in them diffuse psoriasis appears in a severe form, generally from the age of two months to two years. Dr. Willan (vol. i. p. 170) was led to erect this into a distinct species (*psoriasis infantilis*) in consequence of the affection of the mucous membrane of the nostrils which usually accompanies it, and the intermixture of scaly patches with smooth shining elevations, which in the cleft of the nates often assume the appearance of moist flattened condylemata. But we have seen this occur in other squamous diseases, apparently from the mere action of heat and moisture preventing the scales from forming, and increasing the morbid turgescence of the affected spots. The disease in this altered form is more amenable to treatment, the flattened elevations yielding in general readily to the application of sulphate of copper.

When diffuse psoriasis continues its progress unabated, it either destroys the patient by the effects of cutaneous irritation, and of the accompanying morbid condition of the alimentary mucous membrane; or more frequently it degenerates into the inveterate form (*psoriasis inveterata*). But the severity of the disease is usually limited to a few months, after which it becomes greatly ameliorated or disappears altogether, again to recur during the variable weather of spring or autumn, most frequently the former, but sometimes at both seasons.

The causes of this species of psoriasis are the same as those already enumerated; but it appears oftener to originate from the application of irritating substances to the skin, and exposure to sudden alternations of temperature: hence arise the local varieties which occur in washerwomen, bakers, shoemakers, workers in metals, and cooks. The first of these is often very severe, affecting the hands, wrists, and fore-arms, particularly about the part up to which they are usually immersed in the washing-tub. It arises from the irritation of the soap, and the alternate exposure of the skin to hot water and cold air, and is most frequent in spring and winter.

The baker's itch (*psoriasis pistoria*) is confined chiefly to the back of the hand, where the skin is more tender than in the palm, and where it is exposed both to the irritation of the flour and to the strong heat of the oven. We have also observed a cutaneous affection somewhat similar on the hands of cooks, arising from exposure to the scorching heat of the fire.

* On Cutaneous Diseases, vol. i. p. 156. To the works of Dr. Willan, and of his pupil and follower Dr. Bateman, the writer of this article gladly acknowledges the heavy debt which he owes. Not to have drawn from the rich treasures left us by those distinguished physicians, would have been at once discreditable to himself and unjust to his readers.

† Maladies de la Peau, Pl. 13. Another form of the same species has been named by him *dartre squameuse orbiculaire*. Pl. 14.

3. **Psoriasis Inveterata** (inveterate scaly tetter; dartre squameuse lichénoide). This, as its name imports, is the most obstinate of all the forms of the disease, sometimes originating in the diffuse species, at other times being the consequence of *prurigo senilis* or of *eczema rubrum*. It is characterized by an exceedingly thickened state of the cuticle, which appears in firm layers of a glistening white colour, resembling the shining bark of a tree, or the skin of a dried fish; divided not into the mosaic of ichthyosis, but by transverse lines and fissures: it often encases a part or the whole of a limb, and sometimes extends over the greater part of the body, leaving unaffected a portion of the face, or perhaps the palms and soles. The edges of the divided cuticle are usually curled inwards, and these chinks open and close with the motions of the body, which in such cases are not unfrequently attended with a rustling or slight crackling noise. A quantity of thin fluid, sometimes tinged with blood, oozes from the fissures, and occasionally large portions of the thickened cuticle are detached, leaving a bright red and exceedingly tender surface, at first discharging copiously a watery liquid, and then becoming covered with a hard dry epidermis, which separates from time to time in large plates. The formation of scales and flattened crusts is so rapid in this disease, that great quantities are found every morning in the patient's bed, (*Willan*, on Cutaneous Diseases,) resembling in this respect the decline of mercurial eczema, in which, however, the appearance is produced by the drying of the serous discharge rather than the formation of true scales. When the cuticle is thus extensively and deeply diseased, the nails participate in the change, becoming thickened and brittle, frequently separating and being renewed.

4. **Psoriasis Gyrata,** (serpentine scaly tetter). This very rare species of psoriasis is chiefly remarkable for the red waving ringlet-like stripes which it presents on the back or breast of the patient; the figures on one side of the spine, or on one breast, often bearing a near resemblance to those on the other. It is unnecessary to describe minutely the fantastic shapes which it sometimes exhibits; suffice it to say that the red colour of these tortuous stripes is partly shaded by a thin covering of light branny scales, which are constantly being thrown off and renewed. It is distinguished from herpetic and impetiginous eruptions, to which it bears a remote general resemblance, by the absence of vesicles and pustules. Like other species of psoriasis, it is much influenced by the weather and the seasons of the year—subsiding in summer, and becoming more intense in spring and autumn.

Such are the great divisions of psoriasis founded on its peculiar forms and the degree of its severity, and under them, especially the diffuse species, may be ranked all the local varieties which have been described by Dr. Willan and others. The most important, and perhaps the most common of these varieties, is that which affects the palms of the hands, (*psoriasis palmaria:* dartre squameuse centrifuge): it is characterized by inflammation and thickening of the skin of the palm, with scales dispersed over the surface; and very often fissures, from which thin fluid oozes, attended with heat, itching, and sometimes considerable pain on extending the fingers. Patches of the same description appear also on the inside of the wrist and on the sides of the fingers; the nails likewise are affected in protracted cases, becoming thickened and opaque, and mouldering away or being cast off. This is often observed to be an hereditary disease, and in those disposed to it the nails usually possess an unnatural brittleness which makes them snap under the scissors. In such individuals the exposure of the hands to a cold dry wind, or frequently moistening them, is almost sure to induce some degree of psoriasis. The same affection is seen also on the soles of the feet, but in a less severe form, and rarely accompanied with fissures, as the feet are much better protected from cold, and very seldom exposed to the air while moist.

Diffuse psoriasis is sometimes seen on the scalp, producing an inflamed state of the skin, and a copious formation of white scales: in some instances the bulbs of the hairs become affected, and baldness is the consequence. The skin around the different natural apertures of the body is also subject to psoriasis, which, from the movements of the parts, is almost always productive of painful fissures. Thus it is met with on the edges of the eye-lids (*psoriasis ophthalmica*), the lips (*psoriasis labialis*), the nostrils, and on the verge of the anus and prepuce (*psoriasis preputialis*). When the lip is affected with psoriasis, it is most commonly the prolabium of the under lip: its causes are obscure, but Rayer (Maladies de la Peau, t. ii. p. i. p. 35,) states that he has twice observed it in persons who were great talkers, and addicted to the practice of biting their lips. The scrotum is likewise subject to this disease, and that generally in the inveterate form (*psoriasis scrotalis*).

Treatment.—The treatment of psoriasis is rendered of much greater importance than that of many other cutaneous diseases by the severe suffering which in many of its forms it produces; by its long continuance, sometimes for a lifetime; and by the obstinacy with which, after an apparent cure, it returns on a change of season, or the application of some slight occasional cause. It very seldom exists to any considerable extent along with a general healthy state of the frame: the system is usually either oppressed by the effects of a luxurious and indolent mode of life, or enfeebled by bad health, or by scanty nourishment and clothing, neglect of cleanliness, and the other concomitants of poverty. In both of these cases a change in the mode of living and in the state of health must be accomplished before we can hope to derive permanent benefit from the employment of remedies. A strict regimen, extending to every particular of diet, clothing, and exercise, suited to the peculiarities of the individual, must be the first step in our treatment. Should much irritation exist, and the strength of the patient permit, blood should be taken by venesection or cupping; and in the local varieties, such as the palmar and ophthalmic, leeches in the vicinity will be found useful. A general antiphlogistic regimen should be pursued, the use of spirituous liquors abandoned, and even wine and ale very sparingly, if at all, allowed; pickles, sour

fruits, vinegar, shell-fish, baked meats, pastry, highly seasoned dishes, and other indigestible food, should be carefully avoided. The bowels ought in every instance to be freely opened and kept in regular order: in many cases a sustained purgative treatment by calomel and saline medicines has succeeded in effecting a cure. In the hands of M. Biett (*Schedel et Cazenave*, Abrégé pratique des Malad. de la Peau,) this mode of treating psoriasis has proved highly advantageous; but it has been strongly opposed by Willan and Bateman, whose opinion on this subject has tended in no small degree to prevent British practitioners from making a fair trial of its efficacy. Of this practice our own experience does not enable us to speak with confidence; but we believe that it will be found to be suited only to those cases where there exists a tendency to plethora. Psoriasis, we have already stated, is sometimes combined with an opposite condition of the system, as it is met with in delicate chlorotic females. In these a course of tonic medicines, consisting of the preparations of cinchona and steel, will be necessary, if not as the immediate means of cure, at least for the purpose of preparing the body for the successful employment of other remedies.

Mercurials as well as purgatives have been denounced in general terms by Willan and Bateman, (*Willan*, vol. i. pp. 183, 184; *Bateman*, Synopsis, p. 43,) as unsuited to the treatment of psoriasis; and it must be admitted that the full action of mercury in this disease is positively injurious, as Willis (De Medicin. operat. Opera, p. 292,) long ago discovered. But it will not be denied that this remedy, when judiciously managed, in small and alterative doses, possesses a great power of correcting many of the disordered states of the digestive organs, and of restoring to the skin a soft and perspiring condition. The mercurial pill, mercury with chalk, Plummer's pill, and corrosive sublimate, have in our hands proved very serviceable, both in psoriasis and other scaly affections. One of the numerous remedies which have been employed internally for the cure of this disease is sulphur: it may be considered to act both as a revulsive, and by its immediate effect on the skin, through the pores of which, even under scaly disease, it is exhaled in the form of hydro-sulphurous gas. Among the different modes of exhibiting this popular remedy, may be enumerated the sulphureous mineral waters, sulphur conjoined with soda, with magnesia, or with cream of tartar; and, lastly, the diluted sulphuric acid, which was given by Dr. C. Smyth in very large doses, and, according to his report, with excellent effects. (*Smyth*, in Medical Communicat. vol. i. p. 191.) It is proper here to remark, that the sulphuric acid, when taken diluted, undergoes decomposition in the alimentary cavities; and that by its continued use the body becomes impregnated with sulphur, just as when that substance itself has been administered.

We are furnished with still more powerful remedies of a revulsive character in the tincture of cantharides and the different preparations of arsenic. The former of these was first recommended by Dr. Mead* in cutaneous diseases; and since his time its reputation has undergone many vicissitudes. Dr. C. Smyth, Dr. Falconer, and Dr. Willan, speak of the tincture of cantharides as altogether inefficient in the treatment of scaly disease; but M. Biett, (*Schedel et Cazenave*, Abrégé pratique,) at the Hospital St. Louis, has revived the use of this medicine in psoriasis, and found it to possess great efficacy. Our own experience has convinced us of its utility, but we have been repeatedly obliged to relinquish its employment in consequence of its effects on the urinary and generative organs. Arsenic, which was first introduced by Dr. Fowler in the treatment of squamous affections, has maintained its character among British practitioners with little or no interruption, and has even gained a place in the estimation of the physicians of France, notwithstanding the denunciations of the school of Broussais. M. Biett uses the solutions of Fowler and Pearson, and has also introduced into practice the arseniate of ammonia, of which he speaks very favourably. He employs, likewise, with advantage, the arsenical pill formed of the protoxide and black pepper: each pill contains one-thirteenth of a grain of arsenic, and two daily are considered by him as the maximum dose. Iodine is another medicine of the revulsive class, from which we anticipate very beneficial results in the treatment of psoriasis, but as yet our limited trials do not enable us to speak of its effects with confidence. Before taking leave of these powerfully acrid substances, it is necessary to caution the younger portion of our readers against employing them during the existence of constitutional disturbance or irritation of the digestive organs, and to point out the necessity of attentively watching their effects, that any inflammatory movement or deleterious influence on the stomach or brain may be immediately counteracted. In some cases, when the appearance of such symptoms has obliged us to suspend these medicines, great benefit has been obtained from bloodletting, both in allaying the irritation which they had caused, and subduing the cutaneous affection.

There remain to be noticed some other remedies of the revulsive tribe which possess a certain degree of efficacy in scaly diseases. The tincture of white hellebore (veratrum album), and pitch given in large doses in pill, are both highly recommended by Dr. Bateman: from the latter we have seen beneficial results. The liquor potassæ has occasionally proved useful in psoriasis, as we have repeatedly experienced; and when this disease exists along with the lithic diathesis, as in gout and calculus, (no unusual combination,) its property of correcting acidity affords a prospect of decided benefit. (See the case of Horace Walpole, Phil. Trans. vol. 50, p. 206.) The bitter sweet (solanum dulcamara) has likewise obtained considerable reputation for the cure of psoriasis; its effects are rather narcotic than revulsive; but its sensible action, in the doses usually prescribed, is seldom very obvious. The belief in its efficacy as a remedy for scaly eruptions rests on unexcep

* Medicina Sacra, cap. ii. Although Dr. Mead's remarks refer professedly to the leprosy of the Jews, he appears to have had in view scaly diseases; for he describes, as an instance of leprosy, the case of a countryman, whose skin was glistening like snow with white scales, which, when rubbed off, left a raw surface exposed. This individual seems to have laboured under psoriasis inveterata.

tionable authority; (*Crichton*, in Willan on Cutaneous Diseases, p. 145); and the remarks of Dr. Gardner (in Med. and Phys. Journ. May, 1830) on the defective mode in which the decoction is usually prepared may serve to explain much of that disappointment which has of late been experienced in its exhibition.

Psoriasis being remarkable for the severity of its local effects, we are naturally led to attempt its cure by means of topical remedies; and although these alone will rarely prove effectual, it must be acknowledged that, without their judiciously directed aid, we shall rarely if ever succeed in obtaining a satisfactory result. We are often enabled to relieve the patient's sufferings by such applications, as infusion of almond meal or of bran, decoction of poppy-heads, weak spirit lotion, emulsion of bitter almonds, lotions containing hydrocyanic acid, cream or fresh butter, neat's foot or almond oil, [or cod-liver oil]. A still more soothing effect on the whole frame will be produced by the use of a tepid or moderately warm bath, to which a quantity of bran or a little carbonate of soda or potass has been added. A favourite remedy among the French for the same purpose is a bath of greasy dish-water (eau de vaisselle grasse)—rather an unseemly application. After due attention has been paid to the state of the general health, and when the severity of the local irritation has somewhat subsided, we may proceed to employ the warm bath, from 96° to 104°, with such friction as can be easily borne, in order to stimulate and soften the skin, and detach the scales. The simple vapour-bath, or this combined with sulphur or iodine, affords still more powerful means of softening the surface and exciting the skin to a healthy performance of its functions, and the secretion of a sounder cuticle. Such baths certainly form a valuable addition to our means of curing every variety of scaly disease, and often enable us to subdue affections which would formerly have resisted all our remedies. (*Rapou*, Traité de la Méthode fumigatoire.) But the vapour-bath, in its different modifications, is a remedy which always demands the watchful care of the physician: its excitement not unfrequently proves too great, requiring its suspension, or even the abstraction of blood. Baths of mineral waters, especially those impregnated with sulphur, have long been resorted to with benefit for the cure of psoriasis; and similar baths, formed artificially by means of the sulphurets, will often be found of great service, provided the disease is not in too active and irritated a state. In the slighter forms of psoriasis, as when it is confined to the face and forehead, a sulphurated lotion, prepared by infusing sulphur in boiling water, has often proved highly advantageous. The internal use of the sulphureous mineral waters, or of corresponding medicines, may be beneficially conjoined. Saline mineral waters and sea-water have likewise been employed in this disease, and from the latter we have seen excellent effects; but chiefly we believe from the influence of sea-bathing in improving the general health. In one very aggravated case of diffuse psoriasis, where the disease was in an active and increasing state under the use of the arsenical liquor, the patient commenced sea-bathing, and anointed the eruption merely with fresh butter: a speedy amendment followed, and the affection almost wholly disappeared in about a month, but it was not eradicated.

Although the transpiration from the affected surface is much obstructed in psoriasis, it is not wholly suppressed; and there are still left many interstices from which an insensible perspiration is exhaled. By covering the part with oiled silk, we retain this and preserve the skin in a continual vapour-bath, which softens it, and tends to restore it to a healthy state. The benefits of such a practice have been long known in the treatment of several local forms of psoriasis, as that of the palms; and the plan may be usefully extended even to cases where a large part of the body is affected. Great benefit is also derived from merely protecting the patches of psoriasis from the action of the atmosphere, which is remarkably evinced in that of the lips, nostrils, and eyelids. Any mild adhesive cerate will answer the purpose; but it is usual to employ one containing a very small proportion of the nitrate, or the white precipitate of mercury. Dr. Willan states that in psoriasis of the lips, nothing but the mildest cerate or plaster can be borne; and that its constant use is indispensable to a cure.

But ointments are employed in psoriasis, not merely to protect and soften the surface, but as strong topical stimulants, to excite the healthy actions and remove the thickening of the skin. Those in most common use are, the ointment of nitrate of mercury, the pitch ointment, and one composed of equal parts of these two. We are indebted to M. Biett for the introduction of remedies of vastly greater power, formed from the preparations of iodine. Of these the most efficient are the ointments of the iodides of mercury and sulphur,* which we have found fully to merit the praises he has bestowed on them. It is necessary for the success of these stimulating ointments that they should be well rubbed into the spots and patches at bed-time, washed off with soap and water in the morning, and if the situation of the eruption permit, again rubbed in, and the same process gone through twice daily. In cases of solid thickening, both of the cuticle and cutis, sometimes seen, particularly in the knee and elbow, where even these powerfully stimulating ointments prove unavailing, we have derived great benefit from the application of strong acetic acid. The agency of this liquid in removing the most obstinate horny warts, and thinning the cuticle, when vinegar and sponging have been long employed, first directed our attention to it as a remedy in psoriasis; and the result of our trials has been highly satisfactory—the diseased cuticle separating in flakes, and a new surface being exposed of a much more healthy character. The application of the acid, which requires to be repeated, is hot and painful, especially when there are excoriations or fissures, but these ought to be protected by some mild cerate. Blisters have likewise been had recourse to in obstinate states of psoriasis, and with marked benefit; but their effects appear to

* *Recipe.*—P. tenuiss. proto iodid. hydrarg. gr. xii.—sc. ii. Axung. purific. oz. i. *m.* ut fiat ung.

Recipe.—P. tenuiss. deuto iodid. hydr. gr. xii.—sc. iss. Axung. purif. oz. i. *m.* ut fiat ung.

Recipe.—P. tenuiss. iodid. sulphuris, sc. i.—sc. iss. Axung. purif. oz. i. *m.* ut fiat ung.

be less permanent than those of the acetic acid. When there is oozing of fluid from the patches of psoriasis, advantage will be derived from the use of astringent lotions, as the liquor alum. compos. and solutions of corrosive sublimate, or of sulphate of copper; and when the effusion of moisture has thus been dried up, and the parts are a little hardened, which readily takes place, some mild adhesive cerate may be applied at bed-time and washed off in the morning. By steadily persevering in this plan, very troublesome cases of the local forms of psoriasis have been completely cured. In some of these obstinate varieties, particularly that of the scrotum, fumigations with sulphur and with cinnabar have effected a cure.

[Recently, anthrakokali and fuligokali, simple and sulphuretted, have been recommended both internally and externally. (See the writer's *New Remedies*, 4th edit. p. 57 and p. 321, and Mr. E. Wilson, *A Practical and Theoretical Treatise on Diseases of the Skin*, Amer. edit. p. 351, Philad. 1843.) Cantharides have likewise been employed externally. Dr. Davidson (*Lond. & Edinb. Monthly Journ. of Med. Science*, Dec. 1841) noted the comparative effect of iodide of sulphur, and the acetum cantharidis of the Edinburgh Pharmacopœia in an inveterate case of several years' standing, in which a variety of remedies had been tried in vain, and found the latter more efficacious. (See Lepra.)]

The long list of remedies which has now been reviewed, furnishes in itself abundant evidence of the intractable and rebellious nature of psoriasis; but it is not without reason that they have been enumerated, for it is well known to those familiar with chronic diseases of the skin, that a change of remedies is frequently required; and that one will at length succeed when all others have failed.

Should our efforts to effect the cure of psoriasis have proved unavailing, it will be proper, if the patient's circumstances and general health permit, to recommend his removal to a more genial or even a warm climate, when the habitually increased activity of the cutaneous functions, and the change which his constitution is likely to undergo, may render successful the modes of treatment which were previously without effect.

When the cure of psoriasis is about to be accomplished, the scales rapidly drop, and soon cease to be reproduced; the thickening and inflammation of the skin gradually yield; at length the affected parts appear as if slightly depressed, having a somewhat darker tint than the healthy skin, and occasionally we observe around these cicatrices a pale or white border. The completion of these changes on the diseased surface affords satisfactory evidence of the cure of psoriasis; and without this cicatrization, the mere absence of scales amounts only to a temporary amendment.

W. Cumin.

[PTYALISM, or SALIVATION.—An increased secretion of saliva may arise from various causes and is frequently altogether symptomatic,—as in children, during dentition. When it occurs as a symptom, it will be described under the primary affection.

Ptyalism may be considered under two heads—the *first* embracing that which arises spontaneously, often without any obvious cause, and the *second* that which is produced by mercury.

1. Spontaneous Ptyalism.—Salivation occasionally occurs, especially in children, with all the characters of mercurial salivation, when not a particle of mercury has been administered. It is essential to bear this fact in mind, inasmuch as blame is frequently attached to the medical practitioner, where such symptoms arise, under the idea that he has been administering mercurials to an objectionable extent. Salivation may be induced by various articles,—as by iodine, the preparations of gold, copper, antimony, arsenic; and it is said, by Dr. Watson, (*Lectures on the Principles and Practice of Physic*, Amer. edit. p. 434. Philad. 1844,) that it has followed the employment of castor oil, digitalis, and opium. Cases are on record, in which it has occurred to a profuse extent, without any obvious cause. Thus, one is related in which two or three pints of saliva were discharged daily, for some time. The affection ceased under the use of gentle cathartics. Many similar examples are on record.

Treatment.—Should such a case present itself, it will be important to examine, whether there be inflammation, or irritation, from carious teeth or otherwise, in the mouth. Should no adequate cause be discoverable, the disease must be referred to some constitutional or local affection of the glands, which gives rise to secretory irritation, and consequent hypercrinia.

Certain of the remedies, recommended under the next form of ptyalism, may be found serviceable.

2. Mercurial Ptyalism. — **Diagnosis.** — The symptoms of mercurial salivation are well known; but fortunately, not so much so as formerly, in consequence of the comparative unfrequency of the affection, owing to our improved knowledge of the therapeutical effects, and *modus operandi* of mercury. Prior to the supervention of full ptyalism, phenomena present themselves, which indicate that the mouth is *touched* by the mercury. A disagreeable coppery taste is experienced, accompanied by a painful feeling or soreness in the mucous membrane of the mouth, and in the teeth, which appear to be loosened in their sockets; to these phenomena succeed swelling of the gums, inner surface of the cheeks, tongue, and soft palate, which become hot and painful, and, where the cheek and tongue are pressed upon by the teeth, they are found indented. The gums now fall away from the teeth, and at the edges a whitish secretion is poured out, which has an albuminous appearance. This secretion seems, indeed, to invest the mucous membrane of the mouth, which consequently does not appear to be as red as the symptoms would indicate. The parts that are the most swollen and subjected to pressure soon begin to ulcerate, and the ulcers spread, and present a greyish, flabby and fungous appearance, blood readily flowing from them. The lymphatic ganglions, situate between the parts affected, and the centre of the lymphatic system, now become swollen and painful; and, at times, the patient is unable to separate his jaws, and almost to swallow, owing to the excessive tumefaction of the parts. From the very commencement, the breath has a peculiar fetor, and this augments, so that at the height of the disease it is strong and disagreeable. As soon

as the mouth is touched by the remedy, the flow of saliva, and of the mucous secretions of the mouth becomes so much augmented, that the individual is compelled to eject the fluid continually, and where complcte ptyalism has set in, the quantity evacuated is occasionally enormous. Eight pounds in the 24 hours have been mcntioned by M. Andral, (*Cours de Pathologie Interne,*) but this is not the limit. Sixteen pounds are said by Most, (Art. Ptyalismus, *in Encyklopäd. der gesammten Med. und Chirur. Praxis,* Leipz. 1837,) to have been discharged in this way ; the average quantity in health not exceeding four ounces, according to Mitscherlich, (*Rust's Magazin,* xxxvi, 491; see also, Rullier et Raige-Delorme, Art. Digestion, in *Dict. de Méd.* 2de édit. x. 300, Paris 1835.) This increased flow may exist — to a greater or less extent—for many days or even weeks.

At one time, the effect of the remedy in syphilis was measured by the quantity of saliva discharged: —if the disease were of a certain duration, the patient must spit a quart; if of a longer, two quarts, and so on: but now, since the conviction of the practitioner is, that salivation is rarely or never necessary, and that it is rather to be dcplored,— inasmuch as the increased discharge exhausts and irritates, without being of itself beneficial, — the practice has been abandoned, and if we meet with excessive ptyalism, it is generally in those who are easily affected by mercury and in whom the affection supervenes rapidly ; or in those in whom the remedy has, by accident, been persisted in for a longer period than was contemplated. The books were formerly filled with descriptions of the horrible accidents induced by mercurial ptyalism, some of which the author has witnessed ;— as extensive sloughing, loss of teeth, caries of jaw bones; protrusion of the tongue from the mouth; adhesions of the tongue and cheeks, &c. &c.; with, at times, excessive febrile irritation, marasmus, and death. This last event was, however, uncommon. Usually, after a tedious convalescence, the sufferer was restored to health, but occasionally the system received an injury from which it never wholly recovered.

Although thc plan of exciting profuse salivation for the cure of syphilis may now be considered as generally and properly exploded, and, therefore, these cases of ptyalism are comparatively rare, we still now and then observe thc deplorable effects of mercury pushed with equal incaution for the treatment of many of our bilious and other fevers. Not many years ago, an interesting casc fell under the author's care, in which the lower jaw became firmly closcd in conscquence of the formation of ligamentous bands, and of the contraction that had occurred during the cicatrization of mercurial ulcers of the mouth; the bones of the jaw were carious, and portions of them exfoliated; yet, by careful management, —improving thc general habit, and separating the jaws gradually by an instrument contrived for that purpose, they became movable. Within the last few years, the writer has known of other similar cascs, the subjects of which had sought Philadelphia for surgical relief under their deformities.

Causes.—The term mercurial ptyalism sufficiently indicates the exciting cause; but a few remarks are necessary on predisposition. Unquestionably, age has its influence. It is almost impossible,—wholly so, perhaps, in most cases,— to salivate a child under two years of age. There is something in the peculiar evolution of organs at this age that prevents it ; yet, after the age of two, children become very susceptible of mercurial influence, and remain so, although not perhaps to an cqual degree, throughout the remainder of existence. There is, likewise, a marked difference in individuals as to their susceptibility to the action of mercury, — some being affected by the smallest quantity, whilst it is impossible to salivate others by any amount. Temperature has some effect, and exposure to cool air. In hot weather, especially if the individual take exercise, the mercury appears to pass off by the cutaneous transpiration; and, on the other hand, the repression of the transpiration frequently induces ptyalism. Constipation also appears to favour the action of mercury, as diarrhœa usually prevents or retards it.

It is difficult to account for the action of mercury in inducing ptyalism. It obviously enters the blood, for it has been detected in that fluid; and, in this way, probably, it excites a new action not only in the salivary glands, but apparently, in almost all the secretory organs of the economy. M. Andral (*Hématologie Pathologique,* Paris, 1843,) examined the condition of the blood in some cases of mercurial stomatitis, but did not discover any difference between it and the blood of other inflammatory affections. He never witnessed a diminution of fibrin, as is supposed to follow its use by those who prescribe it in certain diseased conditions to diminish the plasticity of the blood, as in diphtheritis, and, indeed, in inflammatory affections in general.

Treatment.—If the febrile and inflammatory symptoms run high, blood-letting—general and local — may be demanded ; but this can seldom be the case. It is a favourite remedy, at the commencement, with one distinguishcd individual, M. Cullerier. Generally, it is best to administer saline cathartics, which act in a twofold manner, both as depletives and revellents.

They should be given to the extent of producing at least two or three liquid evacuations in the twenty-four hours, for the first two or three days, unless their use is contra-indicated. The preparations of sulphur — sublimed sulphur, and sulphuret of potassium — combined, or not, with sulphurous baths, have been long prescribed; under the idea, that the sulphur would exert some chemical agency in modifying the action of the mercury. Few entertain this opinion at the present day: sublimcd sulphur is, however, a gentle and pleasant laxative, and may be given with that vicw.

In the early period of the disease, emollient and warm collutories are found to be the most soothing. These may consist of mucilage of gum arabic, flaxseed tea, infusion of the slippery elm, and similar mucilaginous articles; but, in the after stagcs, greater advantage is derived from agents of a more excitant character. Various astringents have been used for this purpose, such as the acetate of lead, the sulphate of zinc. and

the sulphate of alumina and potassa. The author thinks that he has derived as much benefit from the solution of chlorinated lime, and from that of creasote, as from any other agents. It must be borne in mind, however, that the art of medicine, in the generality of cases, does not appear to possess much power over the disease, and that whatever internal or external remedy is employed, *time* is an essential element in the cure. A collutory of chlorinated lime not only appears to diminish, in many cases, the excessive secretion from the salivary glands, but speedily mitigates the sense of burning in the mouth, induces the healing of the erosions of the mucous membrane, and corrects the mercurial fetor. If either this, or the creasote wash, should be too stimulating, it must be reduced by the addition of water.

By many, the internal use of iodine has been highly extolled; yet, in the experience of others, its efficacy has been doubtful. It may be given in the form of the tincture, (ten drops, three times a day, in gruel.)

If ulcerations exist, and they resist the local management above directed, they may be treated upon the plan advised under the head of Stomatitis. M. Ricord prefers applying strong muriatic acid to the ulcerations, repeating the application every day, or every other day,—the bleeding of the surface presenting no obstacle. The acute pain it produces soon ceases, and nothing, he thinks, equals its beneficial effects. Should the pain be so severe as to preclude rest, opium or its preparations may be freely administered.

Recently, a case of mercurial ptyalism, occurring in a child four years of age, which had continued for two months and a half, and had resisted all the usual remedies, yielded to warm baths acidulated with equal parts of nitric and muriatic acid, prescribed by Dr. Baumgartner.

The diet, throughout the severity of the disease, should consist of farinaceous substances; but, later on, milk, broths, and the lighter preparations of animal food, may not only be permitted, but be advisable.

ROBLEY DUNGLISON.]

PUERPERAL DISEASES.—The object of this article is to present a general view of the parturient and puerperal states, and of the various diseases which may occur, singly or combined, in their varied circumstances. Such views of an important class of morbid affections are frequently of more practical value than the most laboured treatises on individual diseases. But the present class is one of peculiar moment: no other is so complicated in itself, and none excites such deep interest in the minds both of friends and of the physician.

The class of puerperal diseases must be viewed as embracing all those morbid affections which arise out of the state of pregnancy,—the act of parturition, the complicated condition of the system and organs which immediately follows parturition, and the function of lactation.

In the early period of pregnancy, several organs, but especially the stomach, sympathize with the new condition of the uterus, and suffer severely.

In the later periods of pregnancy several causes combine their influence especially to endanger the state of the brain. It is upon the conjoined and separate operation of these causes that our attention should be particularly fixed, in regard to the diseases of this period; for it is frequently by their co-operation alone that their morbid influence upon the brain is brought into activity, whilst it may occur, afterwards, that one or even several of these causes may be removed, and yet a remaining one may renew or continue the morbid effect upon the brain, which they had conjointly begun. The causes which co-operate in the last period of utero-gestation, in inducing a morbid state of the brain, are chiefly uterine and intestinal irritation, concurring with the actual pressure of the gravid uterus upon the various viscera and vessels situated behind it, and the state of plethora of the vascular system especially, occasioned by this pressure.

During parturition, the contractile efforts of the uterus and of the abdominal muscles add another source of danger to those already mentioned; and it is at this period that the brain is most subjected to fulness and pressure, and that convulsions or even apoplexy are apt to occur.

Several sources of danger are removed when delivery has taken place; and yet this is not always sufficient to protect the patient from an attack of convulsion, for this terrible affection has first occurred even after delivery had been effected. In this case, especially, we suspect that a state of intestinal load and irritation has been the exciting cause of the convulsion. This observation confirms the remark already made, that when several causes have co-operated to induce a state of danger, some may be removed, and yet, if one remain, it may lead to the most disastrous events. This peculiarity in the study of puerperal diseases cannot be pointed out too often or too strongly.

Convulsions do occasionally occur after delivery, even although the system be in a state of exhaustion from hemorrhage. The state of general exhaustion is not, we believe, incompatible with a state of fulness of the brain; but this kind of convulsions will be found, we think, frequently to involve also a state of intestinal load and irritation.

The danger may arise, however, immediately after delivery, more directly and simply, from a state of inanition and exhaustion, the effects of an emptied condition of the uterus and abdomen, of abstracted pressure upon the viscera and vessels along the spine, and perhaps of loss of blood.

To these sources of danger after delivery must also be added the effects, perhaps, of protracted suffering, of violent pain, of mental alarm, and of what may be termed the "shock" of parturition.

There is another series of puerperal affections which do not occur for the most part until some hours at least after delivery. These affections consist principally of uterine, peritoneal, or venous inflammation, of the effects of intestinal irritation, of the effects of loss of blood, or of two or more of these combined. There are two other sources of irritation in the condition of the mammæ, and occasionally of the uterus; and there is that terrible disease, the epidemic puerperal fever.

Considering the important and sudden change which takes place in the condition of the uterus in parturition, we cannot be surprised that this organ should frequently be the subject of inflammation in the puerperal state. Neither can it be

matter of surprise that its appendages, the adjacent viscera, and the peritoneum at large, should not unfrequently participate in this morbid condition. And when we further consider the degree of violence to which the brain has been subjected during parturition, we must be led to expect that this important organ should be left by that process in a state of proneness to inflammation; and this is precisely the case: for next to the viscera of the abdominal cavity, the brain is perhaps the organ which is most apt to become affected by puerperal inflammation, though in fact puerperal phrenitis is a far more rare disease than has been supposed.

We have further to consider the peculiar condition of the internal surface of the uterus after parturition. M. Cruveilhier has compared it to that of a wound. However this may be, phrenitis and inflammation of the absorbents are among the most formidable of puerperal diseases, diseases arising from this peculiar state of the internal surface of the uterus.

There is another not less fertile source of puerperal disease in the state of the alimentary canal after delivery. This state consists, in general, of a loaded or disordered condition of the large intestines, but is sometimes also induced by improper things taken into the stomach. It is most important to observe that the effects of stomachal or intestinal irritation are very similar to those of inflammation, as it affects the head or abdomen; for on the just diagnosis of these cases depends the proper application of the remedies.

Similar observations apply to the effects of loss of blood when these are of the remote character, and attended by the phenomena of reaction.

In this case the head is apt to be so affected as to lead to the idea of inflammation of the brain; and the heart, so as to present the symptoms of disease of this vital organ.

But it is rare that these sources of disease act thus distinctly; it is far more usual to observe them co-operating to produce mixed cases. One of the most frequent of these is puerperal mania. It is in such complicated cases that all the attention and energies of the mind are required to appreciate the influence of each, and to adapt the remedies to this complicated form of disease.

There is not unfrequently, also, a source of irritation in the state of the uterus itself. A certain degree of after-pain is usual in almost every case; but a state of irritation and pain is frequently kept up by the presence of clots of blood, and the efforts for their expulsion. This state of the uterus is full of dangers; not in itself, but by masking and concealing the beginning of dangerous diseases: pain of an inflammatory kind is too apt to be neglected, under the impression that it is but the usual after-pain.

A similar remark may be made in regard to the irritation excited during the establishment of the secretion of milk. This process is apt to be attended by pain, fever, and affection of the head, which frequently mask the beginnings of puerperal disease.

Both these sources of irritation concur to add complexity to the character, and difficulty to the diagnosis of puerperal diseases, and to constitute that peculiarity of this study to which we have already alluded

The first of these classes of disease might perhaps be denominated *parturient*, whilst the second might be distinguished by the epithet *puerperal*; the former occurring chiefly in or near the act of parturition; the latter usually some hours afterwards. There is a third class of morbid affections which follow still more remotely upon child-bearing, and which consist principally of the more continued effects of intestinal disorder or of loss of blood, and issue, for the most part, in an inability to support the drain occasioned by lactation.

A fourth series of puerperal maladies, using this term in its most extended sense, arises out of undue lactation itself. They consist in the various forms and effects of exhaustion, and constitute a most important and interesting subject for renewed inquiry; for we believe them not to be at present by any means fully understood.

There is still another consideration which is full of interest in regard to puerperal diseases,—namely, the state of health of the patient previous to her confinement. That which most frequently modifies the puerperal state is disorder of the general health, which may possess very various characters. It frequently occurs, from such a state of general disorder, that the recovery after confinement is tardy, the secretion of milk scanty, or even morbid, affecting the health of the infant; and that there are many local affections, especially of the head or of the heart, which are full of pain and suffering.

We have now taken a rapid survey of the principal causes of puerperal diseases. It may be truly said that many of these causes co-operate in every case; but it is also true that each puerperal disease is to be referred to one or two of these causes more especially. Every case of puerperal affection may, therefore, be considered as a case of modified disease, requiring that the mind of the physician be active and comprehensive, so as to embrace the numerous circumstances of the disease. This is true in a degree which scarcely obtains in any other class of diseases; and it is on this account that we have represented the study of puerperal diseases as requiring peculiar habits of inquiry and investigation.

Of the morbid affections which occur in the parturient state.—The term parturient is adopted to express the condition of a person just before, just after, and during the act of parturition A brief notice of the morbid tendencies of this state is a necessary introduction to the more detailed account of some of the morbid affections which occur in that which may perhaps be more properly termed puerperal. The distinction between the parturient and the puerperal states will be found to be at least of great practical utility.

We have already cursorily alluded to the principal causes of apoplexy and convulsions, as they occur in the last stage of utero-gestation, and in the act of parturition. It is our present object to enter into this important question with somewhat more detail.

The first cause enumerated as conducing to these affections of the brain was uterine irritation. That this species of irritation does indeed dispose to disease of the brain, is sufficiently obvious from the occasional occurrence of convulsions in cases even of dysmenorrhœa or painful menstruation.

A second exciting cause of affection of the

brain, probably not very different in its nature from the former, is found in the parturient efforts of the uterus when labour has begun. The effects of labour-pain upon the vascular system of the head is sufficiently seen in the flushed state of the countenance; and the attack, or the recurrence of convulsion, not unfrequently takes place with each uterine effort.

With the uterine efforts must, however, be conjoined those of the abdominal and other muscles, in our estimation of the influence of labour-pains upon the state of the brain.

The third cause of affection of the head in the parturient state is stomachal or intestinal load or irritation. It appears almost unnecessary to adduce any example of the influence of these causes upon the vascular system and nervous origins within the head. The presence of indigestible substances in the stomach, and of indurated or otherwise morbid fæcal matters in the large intestines, are amongst the most usual causes of apoplexy and convulsions in those who are predisposed to these affections, and especially in the puerperal state. The late Dr. John Clarke published an interesting and important paper, to which we shall have occasion to revert hereafter, upon the morbid influence of oysters, taken at this period, upon the brain; and it cannot be doubted that other indigestible substances have frequently, perhaps unsuspectedly, produced the same deleterious effects. One of these effects was convulsion. And it is to be particularly remarked that the cases published by Dr. Clarke all occurred after delivery, and of course even after some of the predisposing causes of puerperal convulsion had ceased to operate.

But a still more frequent concurrent cause of convulsion or of apoplexy in the parturient state is a loaded condition of the large intestines. The operation of this cause is frequently made obvious by the effects of purgative medicines and enemata in these cases, both in the relief they effect in the symptoms of affection of the brain, and in the character of the alvine evacuations: the quantity of scybalous fæces which have thus been evacuated in some instances would appear incredible, were not the torpid and dilated condition of the intestine taken into the account.

Nor can there be any doubt that the gravid uterus itself acts by its size and by its pressure upon the descending aorta, in inducing fulness of the vessels of the brain in the last period of utero-gestation. It is on this principle that delivery frequently secures the patient against the recurrence of the fit of convulsion. When the pressure of the gravid uterus falls more particularly upon the vena cava, the effect of interrupted circulation is of course observed in the lower extremities, chiefly under the form of œdema, but perhaps of phlegmasia dolens.

It usually happens, as we have observed already, that apoplexy or convulsion occurs in the parturient state from the conjoined operation of several of these causes; and it is only by an attentive consideration of all of these sources of danger, that the attack is to be prevented in the first place, and its recurrence in the second.

It is important also, with the view of prevention, to consider the probable condition of the encephalon itself immediately leading to an attack of convulsion or apoplexy. It is doubtless one either of irritation or of fulness. Every cause of these morbid states of the brain must therefore be carefully removed and avoided, whilst their effects are combated by the most vigorous remedial measures.

This is the more important, because each recurrence of convulsion is not only attended by immediate danger, but aggravates the morbid condition of the brain and augments the tendency to the repetition of the paroxysms of convulsion. The same observation may be made of each contractile effort of the uterus and abdominal muscles during parturition, which, like the fits of hooping-cough in other circumstances, has in some instances led to convulsion.

The state of the system which obtains immediately after delivery is in many important circumstances different from that which exists during pregnancy and in the act of parturition. The emptied state of the uterus and abdomen constitutes in itself a source of inanition; and there is usually more or less of loss of blood, and sometimes even an extreme degree of hemorrhage, so that the system in general must be considered to be in a state of exhaustion. There can be no doubt that this very exhaustion alone has in some instances induced convulsion; but it is probable that in many, some of the causes of this terrible affection which have been mentioned, and especially a state of uterine, stomachal, or intestinal irritation, have concurred to produce this effect.

The more usual immediate consequences of delivery and of uterine hemorrhage is a state of syncope; this is more or less severe and alarming according to the degree of loss of blood and of the susceptibility to its effects, and varies from the slightest degree of faintishness to such a state of syncope as may endanger life.

Similar effects are sometimes to be attributed to the protracted sufferings of a lingering labour, in other cases to the violence of pain, and in others to alarm and dreary apprehensions and anticipations on the part of the patient. These circumstances sometimes lead to sudden death, an event which may occur immediately upon delivery. In such cases, cordials given during the last stage of labour, the recumbent position guardedly preserved, and the immediate and careful application of the abdominal bandage, may save the patient.

Perhaps the condition of the system under the influence of some of the circumstances of parturition cannot be better expressed than by the term 'shock;' and it may be aptly compared to a similar state under very different circumstances, and especially those of a painful operation. This state of shock seems to consist of a partially suspended power and action in the system. It may be suddenly fatal, or it may yield to reaction, which may or may not pass the boundary of health; or, lastly, after some feeble efforts, it may lead to a gradual but irretrievable sinking of the vital powers. This subject has not been sufficiently noticed in medical writings, especially in connection with the parturient state.

One of the influences of shock still requires to be mentioned. Many causes of disorder may long remain dormant, or may be affecting the system

in the most gradual manner only, until they are called into a more active operation by some kind of shock. This is particularly true in regard to intestinal irritation. This cause of disorder may long subsist in an inactive state, until, by the occurrence of some shock to the system, it is brought into but too effective operation. It is for this reason that the effects of intestinal irritation are so frequently observed in the puerperal state and after various accidents, without which this cause of constitutional derangement might have long remained inoperative, or at least insufficient for the production of acute disease.

In the treatment of apoplexy or convulsions before delivery, and even after delivery, except in cases of profuse uterine hemorrhage, the principal remedy is bloodletting; the second object is the removal of all those exciting causes of the disease which have been mentioned; and the third is cupping of the occiput and neck.

In the case of hemorrhage, the remedies are still the removal of the exciting causes and cupping.

A state of exhaustion from loss of blood generally from the system, does not protect the brain from a state of vascular fulness. This is abundantly proved in the excellent paper of Dr. Kellie, in the Medico-Chirurgical Transactions of Edinburgh, and by the fact of the occurrence of convulsions, and even of apoplexy, in this state of exhaustion It is in this very case that cupping of the occiput is so strongly to be recommended. The brain, in some cases of exhaustion, is relieved by the topical abstraction of a very small quantity of blood; and this relief is not only obtained by a less expenditure of blood, but is more permanent than similar relief by general bloodletting.

[The signs of determination of blood, which often supervene on excessive hemorrhage, are, however, often owing to the irregularity of vascular action induced through inordinately and irregularly excited nervous erethism in the stage of reaction—and, as the writer has said elsewhere, (*General Therapeutics and Materia Medica*, ii. 150, Philad. 1843,) they are best treated by a full dose of opium, sufficient to allay the nervous excitement, after which the vascular tumult speedily subsides.]

The next point in the treatment is the removal, not of one or two, but of all sources of irritation—of all the possible exciting causes.

A point not less important than the treatment of these affections is their prevention. No means would conduce so much to this purpose as the invariable administration of copious warm-water injections at some period before or during labour. The large intestines would thus be relieved of their load, and a great and fertile source of future disease would be removed. And this remark applies not to affections of the head only, but to many other puerperal diseases.

Of the Morbid Affections which occur in the Puerperal State.—The morbid affections which occur in the puerperal as distinguished from the parturient state usually commences at such a period after delivery as may have given space for reaction to take place, after the state of inanition and exhaustion which usually obtains immediately upon parturition.

It should be observed, however, that there is scarcely a disease of the puerperal state which does not occasionally show itself before delivery. In these cases the disease usually remains stationary, or nearly so, until parturition has taken place, and then assumes its exasperated form.

In some instances, and those of the most serious kind, puerperal disease supervenes insidiously, and makes a slow and probably an unheeded and fatal progress.

Even of those puerperal diseases which commence by marked symptoms, the more serious are not always the most unequivocal in their mode of attack. Pure inflammation is, for example, less marked by rigor, heat, and other obvious symptoms, than are the effects of intestinal irritation. This is a point which requires to be enforced upon the attention of practitioners; for, in inflammation especially, it is of the utmost importance to detect the disease in its very origin.

The effects of intestinal irritation and of loss of blood are apt to produce symptoms of increased action resembling those of inflammatory disease, and prompting the use of evacuant remedies. This proceeding is attended by two sources of error: in the first place the symptoms are frequently relieved in the first instance,—a state of faintishness taking place of that of reaction,—and the physician is apt to judge that the remedy had relieved, but was used in too mild a degree to subdue the disease, and is thence led to a repetition of the measure: in the second place, after the first and second moderate use of the lancet, for instance, the reaction returns in a still more violent degree than before; and it is then imagined that the disease, though relieved, was not only not subdued, but had been suffered to make a fearful progress; the lancet is therefore again used, until it may be that the powers of the system yield, and sinking takes place of reaction; or, if the last bloodletting be considerable, the scene may be closed by a sudden and unexpected dissolution.

We now proceed to treat of each particular form of puerperal disease.

Of Puerperal Inflammation within the Abdomen.—Inflammation within the abdomen, as it occurs in the puerperal state, may be divided into three kinds; that which chiefly affects the uterus and its appendages; that which appears to be general over the peritoneum; and that which is confined to a portion of this membrane.

A distinction of still greater practical importance is that between the acute and the insidious forms of puerperal inflammation of the abdomen. Sometimes the attack is distinctly characterized from the beginning; at other times it is of the most insidious character, perhaps to be referred back to a date anterior to parturition, or even apparently issuing out of mere labour-pain. These are points which require to be deeply impressed upon the mind of the young physician, in order that they may induce in him that degree of watchfulness in regard to these diseases which they so imperatively demand.

Inflammation within the abdomen, of whatever kind it may be, is only to be ascertained by the presence of pain, induced or aggravated upon

pressure. This is the pathognomonic symptom of the disease. All the other symptoms are only accessory; and they are all, without exception, inconstant. In some insidious cases of abdominal inflammation, the tenderness even is only discovered by a careful examination; and there is sometimes pain under pressure when there is no inflammation.

These remarks will, we trust, lead to the most careful examination of the abdomen, and of the symptoms in general, in every case of puerperal disease.

The acute attack of puerperal inflammation within the abdomen is frequently marked by rigor. This is frequently in the worst cases only slight. We cannot sufficiently enforce this fact upon the attention of our readers. Some have imagined that there could be no puerperal inflammation of the abdomen without severe rigor; and they have generally supposed that severe rigor necessarily supposes an attack of inflammation. We can most unequivocally attest that both these opinions are erroneous, and contradicted by facts.

We would make precisely the same observations in regard to great heat of surface or fever. We have known many instances of acute puerperal inflammation within the abdomen unattended by heat of skin, and many cases resembling inflammation, but not in reality inflammatory, in which the heat of surface was extreme.

Frequency of the pulse is not a less uncertain indication of inflammation. We are enabled to say, from careful observation, that the pulse is but little accelerated in many cases of puerperal inflammation within the abdomen, whilst it is excessively and even alarmingly frequent in some cases in which inflammation does not exist.

In regard to pain and affection of the head, they are by no means essential attendants upon puerperal inflammation of the abdomen in its first stages, but, on the contrary, appear to denote another and different kind of morbid affection, which may exist alone or as a complication of inflammation.

Pure puerperal inflammation of the peritoneum is to be ascertained by an attentive examination of the abdomen. There is either pain increased upon pressure, or tenderness discovered upon pressure; and this is either general over the abdomen, or confined to the hypogastric region; or, lastly, in cases of partial peritonitis, to some other part of the abdomen. With the pain or tenderness there is frequently either general tumidity of the abdomen, or a local hardness; in the latter case it is frequently such as to denote an enlarged and inflamed condition of the uterus, but it occasionally arises from an affection of the ovarium, or from partial inflammation and suppuration of the peritoneum.

There are sometimes, and only sometimes, sickness and vomiting; there are also, in some instances, a suppression of the lochial discharge, and a flaccid state of the mammæ. But we do not think the precise cases in which these effects do or do not occur, have been distinctly ascertained by the observation of a sufficient number of facts.

In pure puerperal inflammation of the abdomen there is not necessarily much rigor, heat of skin, load of the tongue, affection of the head, or great frequency of the pulse; there is, on the contrary, in many instances, only a slight degree or even an entire absence of rigor, little or no heat of surface, or whiteness of the tongue, little frequency of the pulse, and no affection of the head. But the countenance, manner, and respiration, usually become highly characteristic.

Puerperal inflammation within the abdomen is marked by an expression of extreme pain and anxiety in the countenance; the brow is contracted, and the upper lip is drawn upwards in a peculiar and characteristic manner, and bound round the teeth or rather gums. These appearances are increased on pressing upon the abdomen, or they are observed at that moment if they had not been manifest before. The countenance is generally pale and rather sunk, but with partial heats.

The manner of the patient is much changed, and has become expressive of suffering and anxiety. The movements of the body are attended by pain, and are therefore suppressed; or if performed at all, it is with an expression of suffering in the countenance, and of caution in the manner; and there is an appearance as if the body had become heavy and helpless.

The respiration becomes rather hurried and anxious, and it is performed principally by movements of the thorax, those of the diaphragm and abdomen being more or less, sometimes completely, suppressed,—a circumstance which gives great peculiarity to the appearance of the breathing. Sometimes there is considerable heaving of the chest, with some hurry, some noise from the ingress and egress of the air, and sometimes with a sort of blowing: this state of the respiration is attended by the utmost danger, being frequently one of the first symptoms of the sinking state, of which we shall have to speak immediately, and to which we wish earnestly to call the attention of our readers.

The general surface is usually a little increased in its temperature, and there is frequently perspiration.

The pulse is at first only moderately frequent, but gradually becomes more so, and it is often small and apparently feeble.

We have already alluded to the occasional occurrence of sickness and vomiting. The abdomen is frequently tense and tumid, as well as tender under pressure: this is an affection to be anxiously watched; it sometimes increases to a state of complete tympanitis. The state of the bowels is very various; there is by no means always constipation; sometimes there is diarrhœa, with or without the discharge of mucous stools.

Instead of general tumidity of the abdomen, there is frequently a distinct tumour with tenderness in the region of the uterus, in the iliac region, or in some other region of the abdomen, leading to the suspicion of an especial affection of the uterus or ovarium, or of a partial inflammation and suppuration of the peritoneum.

We have thus described the most usual form of puerperal inflammation of the abdomen in its commencement. It does not seem either possible or profitable to divide the disease into distinct

stages. But it is quite incumbent upon the practitioner to trace the usual changes which are observed in this disease: these are, first, a gradual amendment; secondly, a gradual exasperation of the disease; and thirdly, the supervention of the state of 'sinking.'

Little can or need be said upon the two first of these changes. Every appearance of a return to a healthy state of the functions and general appearances of the patient will raise our hopes; but there are no points of so much importance to be watched as the expression and condition of the countenance, the manner, and the state of the abdomen.

No apparent amendment is to be at all depended upon unless it has continued and been progressive for four-and-twenty hours; this is a caution of great importance to the young physician, in guiding him in his expressions in regard to the prognosis. And even in the most favourable cases the further progress towards recovery is to be watched with the utmost care and precaution.

In the less favourable cases the countenance becomes more and more altered, the pulse more and more frequent, the abdomen more tender and tumid; the muscular powers of the patient appear overwhelmed; the respiration becomes more heaving, and, as we have usually termed it "blowing," being somewhat audible, — a condition of the breathing always attended by the utmost danger. At this period, too, there is often some degree of delirium, alternating perhaps with slight dozing, and there are generally restlessness and jactitation, and the patient cannot bear the arms to be covered.

At this period, too, the tongue is frequently loaded and more foul, and sometimes dry; the bowels are variable, frequently flatulent and loose. The mammæ are flaccid, the lochia suppressed; the skin is clammy and wet, if not cold; the hands and wrists are often livid, and the feet cold.

This description of symptoms applies to the case of general inflammation of the peritoneum. The more partial cases of peritonitis continue longer, and affect the constitution less and less rapidly. In some instances the integuments over the seat of the inflammation have become tumid and inflamed, and an issue has at length been effected for the subjacent pus; the abscess has afterwards collapsed and healed, and the patient has slowly but finally recovered. This opening frequently takes place about half-way between the umbilicus and spinous process of the ilium. In other instances the matter has been evacuated by the rectum, and in some rare examples by the bladder. In other cases the abscess has not been evacuated during life; but the patient has become gradually emaciated, and the health and strength have failed; there have been great frequency of the pulse and hectic, and the disease has at length, though perhaps very slowly, proved fatal. It has, however, occasionally happened that the effused fluid has been re-absorbed, and the fatal event averted.

But the acute form of puerperal peritonitis sometimes issues in a state of sudden sinking of the vital powers. The change and symptoms are such as have frequently led to the suspicion of gangrene having taken place; but no such appearance is observed after death.

This state of sinking is usually rather abrupt in its manifestation. The patient may be left not without hope the preceding night, but on being visited on the ensuing morning is found to have passed into a state of hopeless sinking. The pain has ceased, but the tumidity of the abdomen is augmented; the breathing is attended by heaving and blowing; the skin of the arms and hands is cold, clammy, and livid, the livid colour only partially disappearing on pressure; the pulse is thready and excessively frequent; the countenance is altered and sunk; the patient may be roused, but is then, perhaps, unconscious of pain, and expresses herself as being relieved; the hands are kept out of bed; sometimes there is cough, and the feet are livid and cold.

The morbid appearances usually induced in cases of inflammation of the uterus and of the peritoneum are well known.

In inflammation of the uterus there are, in different instances, exudations of serum, of coagulable lymph, and of pus, or it is the seat of distinct abscesses; and its internal surface is frequently morbidly red, and the source of various discharges. The appendages of the uterus are frequently the seat of similar morbid appearances.

The peritoneum when inflamed pours out serum, coagulable lymph, or pus; and its different surfaces are apt to be variously glued together. Frequently the intestinal canal is found distended to the utmost, as before death, by fetid gases.

In some instances pus is effused and deposited in various parts of the peritoneum, being confined by the adhesion of contiguous portions of this membrane.

There is no part of the peritoneum, and no viscus in the abdomen, which may not become the seat of puerperal inflammation and of the consequent changes of structure. The parts most frequently affected by puerperal inflammation, however, are the organs contained within the pelvis, — the uterus, its appendages, the rectum, the bladder, and the peritoneal lining of the pelvis; and then the peritoneum in general. In an interesting case, published by Dr. Ley, the spleen was found to be a principal seat of disease.

We now proceed to state the treatment of puerperal inflammation, and we must observe, in the first place, that nothing can be trusted to to save the patient but the most ample bloodletting, and in the second place, that nothing should preclude the use of this remedy but the actual existence of the state of sinking.

In regard to the measure and the repetition of the bloodletting, many points must be taken into consideration. The earlier and the more fully this remedy is employed, the more efficacious and the safer it is, and the safer is its full repetition.

There is one point which we would particularly impress upon our readers. It is, that the bloodletting should in this disease always be performed when the patient is in the erect position; and it may then in general be safely carried to deliquium. We do not recommend this mode of proceeding with the view of producing deliquium merely, but also that this deliquium may serve

us as a guide in judging of the extent to which we may carry the depletion. If the patient be sitting upright, and faint by the loss of blood, we have a security and remedy against any danger from this event in laying the patient low; but if deliquium be induced by bleeding the patient in the recumbent position, we cannot say that we think it will be always without danger. We think the plan which we have proposed at once far more safe as well as far more efficacious in subduing this disease. If it were requisite, the patient's head might be laid even lower than the rest of her body, should deliquium supervene.

The same rule may apply for the repetition of the bloodletting. If the fullest effect is desired which the patient can safely bear, let her be bled to syncope in the erect posture. She will faint from losing a larger or a smaller quantity of blood precisely in the inverse proportion of the previous exhaustion; the state of syncope will not only warn us to desist from drawing more blood, but will arrest the flow of blood itself just at the point when the patient can bear to lose no more.

This is a most important criterion for the employment of a most powerful remedy. We do not by any means wish it to be understood that it is always safe to bleed to deliquium in the erect posture; but that, when it is determined to bleed, it is important to have the boundary, which it would be unsafe to pass, at least clearly defined.

Sometimes the patient will faint on being merely placed upright; is it then, ever, and in what particular cases, safe to bleed?

The next question is in regard to topical bloodletting, and we think there is one important rule for the adoption of this remedy. It may of course be enjoined to be done immediately after general bloodletting; but it is particularly useful in those cases in which the system is obviously subdued by the general bloodletting, and yet the inflamed part remains tender under pressure. In such cases leeches, or, still better, cupping, if it be properly and tenderly performed, will prove a most useful remedy.

It is quite unnecessary to state the utility, or rather the necessity, for the administration of purgative medicines in this disease. There is good reason to suppose that some cases have been subdued even by this remedy alone; and the efficacy of purging in conjunction with bloodletting is quite undoubted. A constant catharsis should be kept up, indeed, until the disease is completely subdued.

In cases in which there is great tympanitic distension of the abdomen, an injection of warm water sometimes succeeds in inducing evacuations of flatus, which greatly relieve. We have sometimes thought that still more effectual relief of the same kind might be obtained by the introduction of a flexible tube, properly pierced, high into the large intestine.

Much and important relief may also be afforded in some cases in which suppuration has taken place, by giving exit to the pus when it plainly fluctuates and approaches the surface.

Blisters are also of great service in those cases of this disease which are not attended by much heat or irritability; but in other cases they have appeared to us to add to the patient's sufferings, to prevent sleep, and to do harm by leading to a state of exhaustion.

There are still three other powerful remedies of which a cursory mention must be made in this place. The first is vomiting, which is well known to have been so successful in the hands of M. Doulcet of Paris. The second is the spiritus terebinthinæ, recommended by Dr. Brenan of Dublin. The third is the attempt to induce a state of ptyalism by mercurial medicines and inunctions.

Emetics, like purgative medicines, but especially the spiritus terebinthinæ, have doubtless been used successfully in many cases; but we much suspect that many of these cases were not inflammation, but intestinal irritation.

Ptyalism would seem to deserve a trial; it is one of those measures which are most powerful, and yet generally unattended with risk, and it would by no means preclude the adoption of every other more prompt and efficient mode of treatment. If adopted early, it might prevent some of those protracted states of the disease which occasionally occur and wear out the patient.

During the existence of inflammation the patient should be allowed absolutely nothing but tea or gruel in the smallest quantities.

In some cases in which the pain is not severe, but the tension of the abdomen great, continued but extremely light frictions of the abdomen have done great good. They may be followed by the application of a cold lotion and by fomentation of the feet.

In cases of pure inflammation the use of opium is not desirable. The pain must be subdued by bloodletting; and every thing that by masking the pain can divert our minds from the use of this remedy involves danger to the patient. And there are seldom those symptoms of constitutional irritation which require the use of opium until the inflammation has subsided. In mixed cases we think the use of opium, especially after bloodletting, may be both necessary to subdue constitutional irritation, and beneficial in the cure of the disease. [Under Peritonitis and Narcotics, the value of opium in this and similar phlegmasiæ has been fully investigated.]

Of the effects of Stomachal and Intestinal Irritation.—Some of the effects of intestinal irritation may be observed before parturition; but it is far more usual to find them developed afterwards. They generally take place rather suddenly, about forty or fifty hours after delivery; but the puerperal state appears so to dispose to this affection that the presence of any cause of stomachal or intestinal irritation cannot always be borne with impunity for many days even after delivery.

This affection may, for the facility of description, be divided into the acute and the insidious; each of these forms manifests itself with general symptoms only, or with some predominant local affection.

The acute form of intestinal irritation is generally ushered in by a violent rigor. This is an important fact; for rigor, as we have already observed, has been considered as denoting puerperal inflammation, and essential to the latter disease.

Neither of these suppositions is true; for puerperal inflammation may occur in a severe and fatal form without rigor; and the severest rigor may only portend an attack of the effects of intestinal irritation; and in general the latter disease is attended even with a severer rigor than the former.

In the attack of intestinal irritation there is usually, after the rigor, great heat of the surface. We have already observed that this is by no means an essential part of puerperal inflammation; indeed we do not think that it properly belongs to the latter disease, but that, when it does occur with inflammation, it denotes a mixed case and the coexistence of intestinal irritation.

In the attack of the effects of intestinal irritation there is usually earlier and even greater frequency of the pulse than in cases of puerperal inflammation; the pulse is also usually fuller than in the latter disease.

Intestinal irritation induces symptoms which are similar to those of the most acute phrenitis, or to those of the most acute peritonitis. This is a remark of the utmost practical importance; for the remedies in these different cases are totally different; and we should say that in the former the freest bloodletting must be aided by purgative medicines, whilst in the latter the freest and fullest evacuation of the intestines must be aided by bloodletting.

A mistake in either case would, in our opinion, endanger the life of the patient; and it is a foolish and idle remark to say that it is better to mistake irritation for inflammation than inflammation for irritation. It is of the utmost importance to attend to the distinctions which we have made between inflammation and intestinal irritation in regard to the treatment; for, although both bloodletting and purging are to be used in every case, yet the former is the remedy in inflammation, and the latter in intestinal irritation. If the cure of inflammation be trusted even chiefly to purgative medicines, we think it will frequently proceed to the destruction of the patient; and if bloodletting should be chiefly employed, in like manner, in intestinal irritation, we believe it would leave the disease unsubdued, and eventually plunge the patient into a state of irremediable exhaustion.

The affection of the head and that of the abdomen frequently coexist or alternate in the same case; but sometimes one of them exists to the exclusion of the other, or supervenes upon the cessation of the other; and in the latter case the affection of the head usually succeeds that of the abdomen. The diagnosis is much confirmed by this conjunction of the two affections.

In the affection of the head from intestinal irritation there is frequently the severest pain and the utmost intolerance of noise, light, and disturbance of every kind. It is in these cases principally that the pavement is covered with straw, the knocker tied, the patient's room kept dark and still, so that these very external circumstances speak a significant language to the physician. To the symptoms which have been enumerated are frequently added wakefulness and even delirium.

When the abdomen is affected from intestinal irritation, there are general pain and tenderness upon pressure, and frequently tumidity, combined with the general symptoms which we have already enumerated.

Much is effected and learnt in this case by the exhibition of large injections of warm water and of active purgative medicines, a careful examination of the evacuations, and a studious observation of the effects produced upon the disease. The fæces will be found to be scybalous, or at least offensive and dark-coloured, and in large quantity; and the relief obtained, or the return of pain, will be found to depend upon the evacuated or neglected state of the bowels.

Another point of great importance is an attentive inquiry into the diet of the patient; this inquiry frequently reveals the mystery of an attack, and of course immediately leads to the adoption of an important remedy.

In regard to the course of cases of intestinal irritation, we imagine that under judicious treatment this would always be one of progressive recovery. When a contrary event occurs, we think it is to be attributed to the misuse of remedies, and especially of bloodletting. In this manner some of the symptoms which are detailed in the succeeding section are superinduced, and sometimes a sudden dissolution has overwhelmed the practitioner with consternation.

One of the characteristics of intestinal irritation is the susceptibility to syncope upon bloodletting. This is of course much more remarkable upon a second or third bloodletting than upon a first use of the lancet. No dependence can be placed upon the appearance of the blood drawn. This may be much buffed and cupped in the puerperal state without the existence of inflammation, and in cases of the most decided inflammation these appearances of the blood may be but little observed.

We have scarcely had an opportunity of examining the state of the internal organs after death; for in general the patients affected by intestinal irritation have recovered. But no doubt that such an examination would illustrate the following important remark of the late Dr. Denman: —"We have been told that in the dissection of some who are said to have died of puerperal fever, no appearances of inflammation have been discovered; but I should suspect that in such cases some important appearances had been overlooked, or that errors had been committed as to the nature of the disease, and probably in its treatment." A due consideration of the effects of intestinal irritation will also serve to elucidate other cases of morbid affection, in which the appearances of inflammation were looked for on dissection, but were not found. This observation applies particularly to affections of the head, heart, and abdomen. In several cases of this morbid affection, which we had the opportunity of examining many years ago, no morbid appearances were found on the most careful inspection. We have already sufficiently alluded to the causes of this affection. They are for the most part obvious sources of gastric or of intestinal irritation; the former chiefly affecting the head, the latter both the head and the abdomen, either together or separately.

In the treatment of the effects of intestinal irritation, we would by no means exclude the use of the lancet. Bloodletting may be useful in such a case, for the same reason that it is useful in simi

ple fever. But we repeat that this remedy is only subsidiary to the full and free evaeuation of the bowels, and, if necessary, of the stomach. If it were trusted to alone, or with only a moderate attention to the state of the alimentary canal, or if it were used in the manner which is required to be effieient in puerperal inflammation, we are persuaded that the patient would die of exhaustion, before the symptoms would yield.

The remedies of intestinal irritation and its effects we would enumerate and arrange in the following order: — first, the full evacuation of the intestinal canal; secondly, bloodletting; thirdly, some soothing anodyne; fourthly, leeches, cupping, a lotion, a liniment, or a blister, acecording to the circumstances of the case, for the topieal affection; fifthly, the mildest nutritious food; sixthly, the most absolute quiet, and the most perfect security from light, noise, disturbance, and every other source of excitation; seventhly, great coolness, and free ventilation of the sick-room; and lastly, a constant watehing over the patient during sleep, to avoid the injurious effects of turbulent dreams on the one hand, and of too long sleep and fasting on the other. Upon eaeh of these points we proceed to make such observations as we have learnt from practiee to be of importance.

In regard to the state of the alimentary canal, it is quite obvious that an emetic is the proper remedy when the symptoms can be attributed to any indigestible substanee taken; and we would recommend this remedy, even although it might appear, from the lapse of time, unlikely that the injurious substance should still remain in the stomaeh.

When the case originates from intestinal irritation, we would earnestly recommend that the first remedy should be an enema, consisting of three or four pints of warm water, very slowly and gently forced into the bowels. This should be followed by an active purge; and this should, in due time, be followed by a repetition of the injeetion. The evacuations should be immediately carefully examined, and the effects upon the symptoms of the disease be watched.

To abate the general heat and excitement of the system, to relieve the head or the abdomen, and to ensure perfect safety, the patient should, in cases in which the strength is not particularly impaired, be raised into the erect posture, and be blooded until faintishness be induced. This effect, also, should be carefully watehed and observed. If it oecur from the loss of a small quantity of blood, it confirms the diagnosis; if it do not occur until mueh blood have flowed, it should suggest the suspicion of more than mere intestinal irritation,—of one of those mixed cases which so frequently oeeur, and of which we propose to treat in a subsequent seetion.

We do not imagine that this decided use of the lancet can ever be attended with danger, if there have been no previous loss of blood or other cause of exhaustion. But it could not be repeated with impunity. It would lead to exhaustion with the symptoms of reaction, to the state of sinking, or even to sudden dissolution; and if the case be really one of intestinal irritation, and the other remedies have been duly applied, such repetition of bloodletting will not be required.

It is an observation of great importance, that in inflammation repeated bloodletting is required, and is borne with safety; in intestinal irritation, on the contrary, the repetition of bloodletting is nei ther necessary nor safe.

This free evacuation of the bowels and detraction of blood are very apt to be followed by symptoms of hurry and alarm in the system. These effects are frequently prevented by the timely administration of an efficient and kindly anodyne; and we believe no anodyne is possessed of those qualities in a higher degree than Battley's *liquor opii sedativus*. Of this excellent medicine a full dose may be given, and, if necessary, repeated in five or six hours.

If this plan do not perfeetly relieve the topical affection, some loeal remedy must be applied. In cases of ecrebral affection, leeches may be applied to the temples, or cupping, or a blister, to the nape of the neek, a cold lotion over the whole head, and fomentation to the feet. Leeches, a fomentation, a liniment, or a blister may be applied, if there be affection of the abdomen.

Before the patient falls asleep, we should recommend some mild food to be taken, as gruel or panada. This plan prevents exhaustion, and frequently relieves the local symptoms by securing a more refreshing kind of sleep. For the same reason the utmost quiet must be preserved in the patient's room. The least disturbance greatly agitates the patient, and prevents the good effects of the remedies which have been employed.

Some other circumstances have been before enumerated which claim our attention in the treatment of this morbid affection; but, in order to prevent repetition, we postpone the remarks which we have to make upon these points to the next seetion,—upon the effeets of loss of blood; in which case an attention to them is, if possible, still more neeessary than in that under our immediate consideration.

On the Effects of loss of Blood in the Puerperal State.—The effeets of loss of blood usually present themselves to our notiee in rather an insidious manner; they are not generally introduced by rigor, or heat, or any other acute symptom; though there may be exceptions to the last part of this rule. It is an important remark that the remoter effects of loss of blood are frequently developed in cases in which there is also intestinal irritation in a dormant form, but that they very rarely occur in conjunction with inflammation; the effects of loss of blood, when they do oeeur in cases of inflammation, generally denote that the inflammatory action has been subdued.

We have already observed that there is rarely either rigor or heat of surface: there may be transient chills and flushes, and slightly augmented temperature; but the eountenance, and especially the prolabium, is generally pallid, and the skin is in a natural state.

The case is usually denoted by a throbbing fulness with moderate frequency of the pulse, throbbing pain of the head and palpitation of the heart, which is apt to alternate with a state of syncope on slight exertion, or on assuming the erect pos-

tune; and there is usually a degree of panting. There is a characteristic susceptibility to fainting on taking a very small quantity of blood.

We have repeatedly known the effects of loss of blood to be mistaken for inflammation of the brain on one hand, and disease of the heart on the other. We consider this an important remark, as suggesting at once two characteristics of this affection, and the necessary caution in the diagnosis in puerperal diseases.

When the head is affected from loss of blood, there are much beating and throbbing of the temples, pain, a sense of pressure, or vertigo, with rushing or cracking noises.

When the heart is affected, there are great fluttering, beating, or palpitation, starting during sleep, hurry and alarm on awaking, sometimes with faintishness, a feeling of sinking or of impending dissolution, &c., and with the palpitation there is frequently beating and throbbing of the carotids, and sometimes of the abdominal aorta, perceptible to the touch or even to the eye. These affections sometimes recur in the form of attacks which are attended by much hurry and alarm.

Besides these more marked affections of the head and heart, which render it so necessary to distinguish this affection from inflammation or disease of those organs respectively, there are many symptoms which occur in a less marked degree or form.

There is frequently an inability to bear noise or disturbance, or even the act of thinking with attention; but there is rarely intolerance of light; the last symptom usually denoting a state of intestinal irritation.

There are frequently vertigo or faintishness on any exertion, or on assuming the erect posture; and when these two are combined, there has sometimes been a sudden and unexpected fatal termination of the patient's sufferings. In many cases there are great faintishness and urgent demand for the smelling-bottle, for the fan, or the fresh air, and for cold applications to the face or temples, and a feeling of impending dissolution. The respiration is affected in different cases with panting, hurry, sighing, heaving, blowing, moaning, gasping, catching, &c. There is in some cases an irritative cough in violent fits, or in the form of perpetual hacking, apparently arising from an affection of the larynx or trachea. The stomach is liable to be affected with retching, vomiting, hiccup, and eructation; and the bowels, even in cases in which they were not previously disordered, become variously deranged, with constipation, diarrhœa, and flatulency. There are frequently, in severe cases, urgent restlessness and jactitation. In some cases there are various spasmodic affections. In other instances there are catching pains, which are apt to be mistaken for inflammation. There are frequent changes, sudden attacks of alarming symptoms, a sense and fear of impending dissolution, urgent messages, &c., which become characteristic of this affection.

Another characteristic consists in the faintishness, gasping, or feeling of dissolution, which sometimes follows even a slight bloodletting; an awfully sudden death has immediately ensued upon a full and mistaken bloodletting at this critical period. Even the operation of purgative medicine has sometimes induced a degree of faintishness.

Every source of disturbance, of anxiety, or of alarm, and every kind of effort either of mind or body, is apt to be followed by a return or exasperation of the symptoms, and cannot be said to be free from danger. We have already remarked that an effort of the muscles and assumption of the erect posture have proved suddenly fatal. This sad event occurred to a lady who raised herself in bed in this exhausted state to make water; she fell down and expired. But when the fatal event from loss of blood is not sudden in this manner, the state of reaction sometimes yields to one of fatal sinking.

The symptoms of exhaustion with excessive reaction may gradually subside and leave the patient feeble, but with returning health; or they may yield to the state of sinking. This term is adopted not to express a state of negative weakness merely, which may continue long and issue in eventual recovery; but to denote a state of positive and progressive failure of the vital powers attended by its peculiar effects, and by a set of phenomena very different from those of exhaustion with reaction.

If in the latter the energies of the system were augmented, in the former the functions of the brain, the lungs, and the heart are singularly impaired. The sensibilities of the brain subside, and the patient is no longer affected by noises as before; there is, on the contrary, a tendency to dozing, and gradually, some of those effects on the muscular system which denote a diminished sensibility of the brain supervene, as snoring, stertor, blowing up of the cheeks in breathing, &c.; instead of the hurry and alarm on waking, as observed in the case of excessive reaction, the patient in the state of sinking requires a moment to recollect herself and recover her consciousness, is perhaps affected with slight delirium, and is apt to forget the circumstances of her situation, and, inattentive to the objects around her, to fall again into a state of dozing.

Not less remarkable is the effect of the state of exhaustion with sinking on the function of the lungs; indeed, the very first sure indication of this state is, we believe, to be found in the supervention of a crepitus in the respiration, only to be heard at first on the most attentive listening; this crepitus gradually becomes more audible, and passes into slight rattling, heard in the situation of the bronchi and trachea; there is also a degree of labour or oppression, sighing, hurry, and blowing, in the breathing, inducing acuteness in the nostrils, which are dilated below and drawn in above the lobes, at each inspiration; in some cases there is besides a peculiar, catching, laryngeal cough, which is especially apt to come on during sleep, and awakes or imperfectly awakes the patient. The heart has at the same time lost its violent beat and palpitation, and the pulse and arteries their bounding or throbbing. The stomach and bowels become disordered, flatulent, and tympanitic, and the command over the sphincters is impaired. The last stage of sinking is denoted by a pale and sunk countenance, inquietude, jactitation, delirium, and coldness of the extremities.

We now propose to detail the principles of the

treatment in cases of the effects of loss of blood in the puerperal state.

In the first place the state of exhaustion from loss of blood, with or without reaction, by no means precludes the possibility of congestion within the head; and it is no less certain that the application of leeches to the temples, or of the cupping-glass to the back of the neck, relieves the symptoms of affection of the head, arising from loss of blood, in a remarkable manner. In a case given by Mr. Hey, which we regard as being of this character, and to which we shall have occasion to revert hereafter, urgent symptoms of affection of the head were twice relieved by the abstraction of but three ounces of blood from the temporal artery. This mode of treatment must not, therefore, be neglected except in the most extreme cases, in which the loss of even so small a quantity of blood, and that from the head even, might prostrate the remaining powers of the patient.

The next point of practice which requires to be mentioned is the state of the stomach and bowels. If these were free from all disorder before the occurrence of the loss of blood, yet the state of exhaustion ever induces a deranged state of the alimentary canal. The state of the bowels must, therefore, claim our attentive consideration in every case of symptoms arising from loss of blood. Their functions and tone must be carefully restored by every means in our power, while we as carefully avoid any fresh source of exhaustion. The bowels must in particular be carefully evacuated daily. This may perhaps be best done by means of the warm-water injection so often recommended by us already, with or without the aid of a draught containing an ounce of the infusion, and two or three drachms of the compound tincture of rhubarb, and of manna.

By these means the state of irritability which is so apt to affect the system, and especially the head and the heart, in cases of exhaustion from loss of blood, is greatly obviated. But for this affection it is frequently also necessary to give some mild but efficient anodyne. The tinctura opii, the tinctura hyoscyami, the spiritus ammoniæ aromaticus, &c. are extremely useful remedies in this affection. But perhaps the best are Battley's liquor opii sedativus, or the extract of poppy, given in efficient doses.

When the head, the heart, and the alimentary canal have been thus relieved, and even during the exhibition of the medicines which have been enumerated, it is of the first importance to attend to all the following points: viz. nourishment, fresh air, quiet, soothing, sleep, &c.

It is difficult to give fixed rules for the administration of nourishment; but the first rule is to ascertain that the bowels have been properly evacuated, otherwise food will only oppress the stomach; the second is to give the nourishment itself in such forms as will prove light and easy of digestion; the third is that it should be taken at first very slowly and in small quantities. Arrow-root in water, beef-tea, panada, sago, &c. may be given frequently.

The best restorative we possess is, we believe, fresh air; but it is especially the best in the cases under consideration. The warmth and closeness of a lying-in room must therefore be forthwith exchanged for free ventilation, only observing the due precautions against giving cold.

Nothing is more essential than quiet both of body and mind. Bodily exertion leads to still further exhaustion, and perhaps even to unexpected dissolution; and every kind of mental effort or hurry not only exhausts the patient's strength, but is extremely apt to lead to those attacks of symptoms of irritability of which we have given so full a description.

The patient should be soothed and lulled in every possible way; and it is of the utmost importance to procure sleep. But it should be observed, in regard to sleep, that too long a sleep is apt to exhaust or overwhelm the patient. This is especially true if it be not preceded by nourishment. The sleep is also apt to be injurious by leading to turbulent dreams, which have the same bad effects as waking hurry of mind; the sleep should, therefore, be watched, and it should be interrupted if the patient is observed to suffer from agitation: this is best done, we think, by offering nourishment, for the patient is immediately collected, on awaking, from knowing what is doing.

There is one point which we have not hitherto mentioned as it deserves; it is the efforts made by the patient to suckle her infant. Nothing is so injurious in all puerperal diseases. These morbid affections have often appeared to be first induced by the attempt to nurse; and they have still more frequently been exasperated by it. This attempt especially involves within itself almost every thing which can be injurious in a state of exhaustion; the drain, the muscular effort, the mental excitement implied in the act of suckling, are all of the most injurious tendency in this affection.

Of mixed cases, and especially of Puerperal Mania. — Perhaps the cases which most frequently present themselves to our notice in practice are of a character distinct from those which have been described in the preceding sections, differing from them principally by blending two or all three of those cases in an individual patient.

Our systems of nosology have, we are persuaded, greatly erred in attempting to separate diseases from each other, and describe them as distinct, when they far more frequently occur in conjunction; so that the mind of the medical student is not at all prepared for the cases which most frequently occur to him when he first enters upon practice. A little experience teaches him the difficulty, nay the absurdity, of attempting to give each individual case a name, or to put it down in a list of diseases. Each patient, on the contrary, presents to him a new congeries of symptoms, a new complication of diseases or disorders.

To apply these remarks to our present subject, it may be truly said that puerperal cases are more complicated than any. But we have already insisted upon this point; and we now proceed to illustrate the various combinations of inflammation with intestinal irritation, or of either or both, with the effects of loss of blood.

Some cases have conjoined the most decided symptoms of intestinal irritation with those of in-

flammation, and, having proved fatal, have presented all the traces of inflammatory action on examination. It has already been shown that in many cases of inflammation there are none of the symptoms which denote intestinal irritation; there is an absence of rigor, of heat, of affection of the head, &c.; but the effects of inflammation are found upon dissection. On the other hand, there have been all the symptoms of intestinal irritation, as rigor, heat, headach, with pain, tenderness, and tension of the abdomen, without a trace of the effects of inflammatory action on examination after death. The conclusion from these separate statements is obvious; inflammation and intestinal irritation may exist separately, but they may also exist together.

The effects of loss of blood are frequently observed in cases of inflammation, when the primary disease has been perfectly subdued. But they are still more apt to concur and to assimilate themselves with those of intestinal irritation, when there has been much loss of blood by hemorrhage or by bloodletting.

This subject, as well as the interesting question of the diagnosis, might be illustrated by a reference to the valuable treatise of Mr. Hey upon puerperal fever. This author, as well indeed as almost every writer upon this subject, appears to us to have combined in one description all the three different cases of which we have treated. It is not, therefore, wonderful that their works should involve many inexplicable discrepancies in the symptoms and in the treatment. Some cases have occurred without rigor, heat, or headach; others have combined all three with or without affection of the abdomen. Some have been cured without the lancet; others have not yielded to the most judicious and most ample bloodletting. It is doubtless a most important question,—how can these discrepancies be explained?

Other difficulties and other discrepancies have arisen from the addition or superinduction of the symptoms of loss of blood, in cases of inflammation or of intestinal irritation. This is a mixed case which frequently occurs, and causes much embarrassment to the young and inexperienced physician; and it has too frequently happened that the lancet has been prescribed under a false impression of inflammation; and that great danger and even immediate dissolution have ensued.

There is a mixed case which shows itself under a still different form from any which have hitherto been described; it is *puerperal mania*. We believe this disease to result, in general, from all the circumstances following parturition combined, but chiefly from the united influences of intestinal irritation and loss of blood. We purpose to pursue this subject hereafter. In the meantime, however, we would observe that we are persuaded that real puerperal phrenitis is comparatively a rare disease; that puerperal mania is seldom of an inflammatory character, and that it is especially to be treated by those measures which are suited to the mixed case of intestinal irritation and exhaustion. This opinion is confirmed by the fact of mania occurring from undue lactation, as well as from the circumstances of the puerperal state. We are inclined to attribute much more to the combined influence of irritation and exhaustion than to the mere "state of the sexual system which occurs after delivery," which has been assigned as the chief cause of this morbid affection by Dr. Gooch, in a most interesting paper upon this subject in the sixth volume of the Transactions of the College of Physicians, p. 280; although we would by no means exclude the influence of this principle altogether. There is ample evidence in Dr. Gooch's cases of the influence of intestinal disorder; and the events of labour and the circumstances of lactation ever add to this a state of exhaustion. This view is the more important, because it directly suggests the proper mode of treatment, which consists in restoring the system to a state of due health by every means in our power, whilst we adopt every measure which can soothe and allay the morbid irritability of the nervous system.

We are confirmed in this view of the nature of puerperal mania not only by a careful investigation of its causes and the good effects of the remedies which we have mentioned, but by having met with the symptoms of intestinal irritation as a prelude to those of mania.

There are frequently also many of the appearances of disorder of the general health, sometimes jaundice even; and the state of the complexion and of the alvine evacuations leaves no doubt as to the influence of the morbid condition of the intestinal canal. Bloodletting plunges the patient into a state of danger, perhaps into one of irretrievable sinking.

Puerperal mania is, in fact, in the most emphatic sense a mixed case: previous derangement of the health; intestinal irritation; loss of blood; the pain and shock, and anxiety attendant on parturition; the subsequent morbid state of the genital organs;—all these may combine with predisposition to induce the maniacal attack.

But our attention must be chiefly directed to the degree of exhaustion which obtains, to direct us what remedies to employ and what measures to avoid.

On being called to a case of puerperal mania, we have long been in the habit of asking whether the patient has or has not been bled; on this greatly depends the event of the case: if blood has been freely taken, the patient will probably die; if otherwise, most puerperal cases of mania issue well.

It must be admitted in this place, however, that puerperal mania may possibly be combined with inflammation, especially of the uterus, its appendages, or the peritoneum. This is to be ascertained by a careful examination. In such a case bloodletting must be used, and in such a case it can be borne.

Puerperal phrenitis is certainly a rare disease. This opinion was early expressed by the writer of this article, and it is confirmed by Dr. Gooch. The same remark may be made in regard to the most influential cause of puerperal mania, and the danger of bloodletting in that disease.

The symptoms in puerperal mania occur in the most insidious manner: there is a little excitement during the day, and sleeplessness at night, then something bordering on delirium; then actual delirium; and then confirmed mania.

The most important parts of the treatment are

extreme quiet of mind and of body; a regulated state of the bowels; a mild, light, but nutritious diet; a cold lotion to the head; fomentations to the feet; every soothing plan; careful watching; and time. It too frequently happens that the friends undo in one day what the physician's care has effected in many: visitors intrude; the infant is brought; conversation, excitement are permitted.

The treatment consists, in fact, much more in avoiding sources of harm than in positive remedies. Bloodletting is replete with danger; every depleting means, by adding to the exhaustion, adds to the malady. The cure depends more upon nursing than upon the materia medica. It is proper, however, to state that the mildest opiates have lulled and soothed, and obtained rest, and allayed the disease. The progress of puerperal mania has also been controlled by administering mercury so as to induce ptyalism, and avoiding its effects on the bowels. [See the article Insanity.]

We have thus given a rapid sketch of those puerperal diseases which are of most frequent occurrence and greatest practical interest. But there is another series of puerperal diseases of a still more terrible character, of which a sketch must now be added. They consist of softening of the substance of the uterus, inflammation of the lymphatics, and phlebitis.

The first of these may be suspected whenever there are, after rigors and fever, with uterine pain or tenderness, and suppressed lochia, symptoms like those of the sinking state, the countenance becoming collapsed, the pulse extremely frequent and small, the respiration hurried and anxious, the strength prostrate.

The symptoms in inflammation of the lymphatics are very similar, and of a typhoid character; these are usually conjoined with those of peritonitis, and occasionally with pleuritis. But there are not the secondary abscesses observed in the disease to be next mentioned.

The important distinction in regard to uterine, as in the other forms of phlebitis, is between the adhesive and the suppurative. In the former the effects are localized. Uterine phlebitis of the adhesive character is attended by local pain and tenderness. The occurrence of crural phlebitis seems to constitute the disease formerly termed the phlegmasia dolens. This disease is distinguished by pain in the situation of the iliac and inguinal veins, with tension and swelling, afterwards pursuing their course down the thigh. The femoral vein is white, tense, elastic, painful, and tender.

The suppurative phlebitis is a far more formidable and fatal disease. It is denoted by the occurrence of terrific typhoid symptoms, and by external suppurative inflammation of the integuments or of the eye; whilst abscesses form internally in the brain, the lobules of the lungs and liver, in the spleen, in the joints, in the muscular substance, &c. It is usually unattended by peritonitis.

Of the treatment of softening of the uterus, and inflammation of the lymphatics, and of suppurative and diffused phlebitis, little is known; and it would be foreign to the object of this sketch to enter upon any discussion of the subject.

Marshall Hall.

PUERPERAL FEVER.—See Fever [Puerperal.]

PULSE. — The stroke or beat of an artery, as recognised, for the most part, by the finger applied to the integuments lying over it, is denominated *the pulse*; by the Greeks it was termed σφυγμὸς; by the Latins *pulsus*, whence our English term is derived.

We propose to divide the following article into three parts, which may be regarded respectively as historical, physiological, and pathological. The first will consist of a brief historical account of what was known on the subject of the pulse by the ancients, as well as the opinions that have been entertained respecting it by the moderns. In the second place, we shall inquire into the cause of the pulse. We shall endeavour to explain its different varieties, and shall point out their connection with the other parts of the animal economy. Lastly, we shall offer some remarks on the morbid conditions of the pulse, and inquire into the degree in which they may enable us to judge of the seat and nature of disease, so as to assist us in forming our diagnosis and prognosis, and in directing our practice.

1. History of the opinions that have been entertained respecting the pulse.—We have a distinct notice of the pulse in the writings of Hippocrates; it is mentioned, however, incidentally, and in a few passages only, and he appears to have attached scarcely any importance to it, either theoretical or practical. It is commonly supposed that he is the first writer who employed the term pulse (σφυγμὸς) to denote the natural and ordinary beating of the artery. It would seem that the ancients usually applied the term to what we should call pulsation, i. e. the beating that is felt by the individual himself, in a part that is inflamed, or otherwise morbidly affected, without applying the finger to it. But although there are certain passages in the writings of Hippocrates where the word is used in the more correct and restricted sense, yet it must be admitted that these are few in number; a circumstance which is the more remarkable, when we consider with what minute accuracy he detailed the other symptoms of the diseases of which he has left us a distinct account. We may farther notice, that from the manner in which he refers to the pulse, he seems to have made little or no use of it, either in regulating his practice, or in forming his diagnosis. Where, for example, he gives a detailed account of the phenomena of fever, he states with great minuteness the temperature of the patient, the state of the respiration, of the secretions and excretions, and indeed all the circumstances to which the most judicious modern physician would direct his attention, except the pulse. The only use which Hippocrates made of the pulse was to assist him in forming his prognosis; but even here we meet with little of that acuteness of observation which, on most occasions, characterizes the writings of the great father of medical science.*

It is generally agreed that Herophilus was the first physician who was fully aware of the import-

* Hippocrates enumerates a peculiar state of the pulse among the signs of disease in his treatise 'De Humoribus;' also, in various parts of his 'Coacæ Prænotiones.'

ance of the pulse, and paid particular attention to its various conditions. He was one of the most distinguished ornaments of the Alexandrian school, and is especially celebrated for his knowledge of anatomy, into which science he introduced many great improvements. The fame of Herophilus is principally supported by the authority of Galen, who expressly notices his merits on this point. (See his treatise De Diff. Puls. lib. ii. c. 10.) We learn, however, from Pliny (Hist. Nat. xxix. 1), that he was supposed by some to have introduced into practice a number of unnecessary and even fallacious distinctions concerning the pulse, and that, for the most part, his opinions were derived more from hypothesis than from actual observation.

The author whom we shall next notice is Celsus. The judicious manner in which he treats his subject, the candour which he displays in referring to the opinions of others, together with the elegance and purity of his diction, have caused him to be regarded as one of our highest classical authorities. This is more especially the case on all questions of literary history, as he appears to have aimed more at giving a correct view of the state of medical science at this age, than a mere transcript of his own observations and experience. In his account of the pulse, he has been supposed to revert to the doctrine of Hippocrates. When giving directions for the treatment of fever, he remarks upon the great importance of obtaining a correct criterion of the presence of the disease, and in this connection he introduces the following observation: "We principally trust to the veins, a thing which is most fallacious, for they are frequently too slow or too quick, depending on the age, the sex, and the peculiar nature of the body." He goes on to inform us that there are various cases in which the pulse is affected by circumstances quite unconnected with any morbid condition of the body, and where we should fall into the greatest mistakes were we to suffer our judgment to be influenced by the state of the pulse. (Lib. iii. cap. 6.) The multiplied and varied experience of the modern practitioner has proved that the precautions of Celsus, although not without some foundation, were carried to an unreasonable length; and that, although the pulse is affected by most if not by all the extraneous circumstances mentioned by him, yet that it still leaves us the most valuable indications of the state and nature of disease.

We now arrive at the period of the celebrated Galen, a man whose talents and acquirements were of the first order, and who from other causes obtained an ascendancy over medical opinions more considerable and more durable than had been acquired by any of his predecessors; and we may venture to add, than will be ever again obtained by any individual. There is scarcely any topic, connected either with medicine or pathology, which Galen has not investigated; and the pulse is one on which he bestowed a peculiar degree of attention. He has devoted to this subject no less than six different treatises, some of considerable length, in which he investigates in the most elaborate manner everything concerning the use of the pulse, its causes, its different varieties, the method of distinguishing these varieties, the prognostics to be deduced from them, and other analogous subjects.*

A characteristic feature of the writings of Galen is the methodical arrangement, and the numerous technical divisions which he introduces into almost all the subjects which fall under his notice. He proceeds on this principle when treating of prognostics, which he classes under the three heads of those which relate to the concoction of the humours, to the absolute removal of the disease, or to particular crises of various kinds. Again, he supposes crises of all kinds to be derived from three kinds of powers or actions, arranging them, according to their origin, under the denominations of natural, vital, or animal; the pulse he regards as principally indicative of the different kinds of vital actions. It would carry us far beyond all reasonable limits, were we to follow our author into his speculations concerning the causes of the pulse, and the mode in which its different actions manifest themselves, so as to give rise to a most complicated system of minute distinctions and varieties, which it is difficult even to comprehend, and of which few only have probably any actual existence.

With respect to the cause of the pulse, Galen, according to his ordinary custom in such cases, attributes it to a specific faculty, inherent in the heart and vessels, which he names pulsative, by which their alternate contraction and dilatation is produced. As the pulse is an effect resulting from the action of the vital faculties, it affords us one of the most correct indications by which we may judge of the strength or weakness of the vital powers in general, and of the consequent tendency to life or death, and thus constitutes one of our most valuable means of prognosis. Hence the extreme importance of making ourselves acquainted with all its variations, and connecting them with the state of the other actions and functions of the animal economy.

The use of the pulse was supposed to be to maintain the heat of the body, and to remove the excess of excrementitious matter from the blood; by considering the condition of the vital powers, in relation to these supposed processes, he lays the foundation for the differences in the pulse which he endeavours to establish. These differences he first arranges under the two heads of simple and compound, which he again subdivides into numerous varieties, depending partly upon the supposed quantity of motion in the vessels, the nature of this motion, the length of time which it occupies, the space which intervenes between the pulsations, the force of the vital action, and the particular disposition of the artery. Proceeding upon these principles, he forms all the supposable combinations of these different circumstances, and from them he deduces a great number of varieties, to which he gives distinct appellations, but which it would be useless to attempt to describe, or even to enumerate.

Those who are curious to obtain farther information on this point may especially consult his dissertation "On the Varieties of the Pulse," a work

* The following are the Latin titles of Galen's Treatises on the Pulse: De Pulsuum Usa; Introductio in Pulsus; De Differentiis Pulsuum, 4 lib.; De Cognoscendis Pulsibus, 4 lib.; De Causis Pulsuum, 4 lib.; De Præcognitione ex Pulsibus, 4 lib.

of considerable length, which is exclusively devoted to this particular object. It may be regarded as one of the most learned of Galen's performances, and as peculiarly characteristic of the methodical and technical manner in which he treats his subjects.

After the age of Galen we have little to detain us until the revival of medical science by the Italians in the sixteenth century. Medicine was, indeed, very assiduously cultivated by the succcssors of Galen, during what are termed the dark ages; and among the Arabs especially, we meet with various individuals of great eminence for their learning. But their attention was almost entirely confined to the writings of the Greeks, and particularly to those of Galen, which they regarded as standards of excellence; these they translated and republished in various forms, and illustrated by almost innumerable commentaries and dissertations, adding very few original observations, and making scarcely any advance in the principles of the science. This system prevailed to so great an extent, that it has been asserted, and, as it would appear, without exaggeration, that for more than one thousand years after the death of Galen, scarcely a single improvement in medicine or physiology was made which has been thought worthy of being transmitted to posterity.

In tracing the history of science among the nations of antiquity, we seldom think it necessary to go beyond the limits of Europe, or the period of Grecian literature; yet it is generally admitted that the Greeks were not themselves the inventors or the originators of the arts in which they so much excelled. It is a question of very difficult decision, what was the country in which they took their rise, whether in Egypt or in India, or in some other part of the East. It is, however, certain that the Oriental nations made very early advances in various departments; and that, while Europe has been undergoing numerous revolutions, and been gradually advancing to its present state of improvemcnt, Asia has remained much more stationary; so that, in many cases, we have reason to believe that it exhibits at this day nearly the same condition which existed perhaps two thousand years ago. This is most remarkably the case with the Chinese, both in regard to their early civilization and to the little change it has experiencced; and it hence becomes a subject of great interest and curiosity to inquire into the opinions and practices of this remarkable people.

We are furnished by the missionary Jesuits with a minute account of Chinese medicine, and particularly of their opinions respecting the pulse. It appears that they paid great attention to it, and supposed that it afforded them indications of almost every change to which the body is subject, as well salutary as morbid. Thus, among other notions, it was conceived that the different organs produced by their derangement different effects upon the pulse, some of which were to be detected by examining the pulse of the right side of the body, and others that of the left. They farther imagined that from the state of the pulse of a pregnant woman, the sex of the fœtus might be ascertained. They arranged the different parts of the body under three divisions, upper, middle, and lower, in conformity with their respective situations; and they conceived, that according as one or other of these parts was affected, so a corresponding state of the pulse was to be recognised. (See especially the "Description de la Chine," by Du Halde.) We might be the more disposed to inveigh against the futility and absurdity of these opinions, were we not aware that they but too much resemble some of those which were supported by the most enlightened and learned physicians of Europe scarcely a century ago.

At the revival of letters, when the human intellect began to rouse itself from its long repose, the mathematical sect of physicians sprung up. Their reasonings were, for the most part, founded upon erroneous principles, and were almost exclusively derived from physical deductions, which were inapplicable to the phenomena of the living body. Still these labours were not entirely without their use, by stimulating the mind to exertion, and by indirectly leading it to those subjects which are more connected with the principles that ought to guide us in our inquiries. It is on this account chiefly that we notice the name of Bellini, a learned professor of Pisa, who flourished in the beginning of the seventeenth century, and wrote a treatise on the pulse. (De Urinis et Pulsibus, 1683.) Although the fundamental principles of the sect to which Bellini belonged were, in many respects, essentially erroneous, yet they led to a closeness of reasoning which was more favourable to the progress of knowledge than the completely hypothetical method of their rivals the chemists.

It was not, however, until the immortal discovery of Harvey was generally recognised, and its importance duly appreciated, that any considerable progress could be made in our knowledge of the laws of the circulation, or that we could expect to form any just conception, either of the theory of the pulse, or of the circumstances that might be supposed to affect it. The general turn for observation which now became prevalent in all the departments of philosophy, of which the discovery of Harvey itself may be regarded as one of the most splendid results, gave rise to various investigations respecting the cause and nature of the pulse, varying much in their respective merits and importance, but all of them professing to be derived from observation or experience, and contributing more or less to the establishment of the principles of a correct theory.

Among the first of these productions which will require our notice, is a work which appeared early in the seventeenth century, in many respects peculiar in its style and in the opinions which the author adopts, but of real value, as possessing the merit of pointing out a precise mode of ascertaining with accuracy the rate of the pulse, by means of an instrument adapted for measuring short intervals of time. This was done by Sir J. Floyer, in "The Physican's Pulse Watch," published in 1707. The instrument which he describes is indeed awkward in its construction, and must have been inconvenient in practice, but it deserves to be recorded, as being the first step of an important improvement.

In the year 1731 a singular work made its appearance, written by Solano, a native of Lucca, but who passed the greatest part of his life in Spain; it was entitled "Lapis Lydius Apollinis."

In the course of his practice he had met with some cases of what is termed the rebounding pulse, and being struck with its peculiarity, and with the symptoms which succeeded it, he was led to pay particular attention to the various states of the pulse, and to the morbid changes which appeared to be connected with them. He accordingly directed his attention almost exclusively to this function, and he is said to have arrived at an inconceivable degree of acuteness in predicting the event of disease by the peculiar indications of the pulse. The result of his experience, real or supposed, forms the subject of his volume, which obtained, at the time of its publication, a considerable degree of celebrity.

The investigation was zealously pursued by Nihell, an English physician, who likewise resided in Spain, and who undertook to give to the world the principles of Solano under a more intelligible form, and divested of a degree of obscurity which is attached to the original. Accordingly, in the year 1745 Nihell published his "New and extraordinary Observations concerning the Predictions of Crisis by the Pulse."

A few years after the appearance of Nihell's treatise, a work of a similar kind was published in France by Fouquet; who, proceeding upon the plan of Solano, endeavoured to point out the connection between certain peculiar states of the pulse and the affection of peculiar organs of the body.

The subject was still farther prosecuted by a learned countryman of Fouquet's, Bordeau, who, in the year 1756, published his "Recherches sur le pouls par rapport aux crises." In this treatise he proceeds upon the method of Solano; but he goes even beyond him in the minuteness of his distinctions, and the apparent accuracy of his discriminations; and from these he professes to draw a system of indications and prognoses, which, although in some of its parts it may not be altogether without foundation, is generally admitted to be derived from subtile and over-refined distinctions, which it is impossible to recognise, and which, for the most part, can have no real existence. It does not appear that in this country the system of Solano ever had any considerable number of adherents, while in France the learning and ability exhibited in the work of Bordeu, aided also by his reputation as an able and successful practitioner, contributed to give a degree of weight and authority to his opinions, greater than was due to their intrinsic merit. Even in the present day, we observe in the French school an attempt at nice discriminations of the pulse, which are conceived by the English to be altogether imaginary, a state of things which may probably be traced, in some degree, to the writings of Bordeu.

For the opinions which have been, of late years, generally embraced in this country respecting the pulse, we are probably indebted in no inconsiderable degree to two short, but very valuable treatises; the first consisting of an essay, which was read by Dr. Heberden before the College of Physicians in the year 1768; the latter, of the "Observations respecting the Pulse," by Dr. Falconer, published in the year 1796.

Dr. Heberden has the merit of having freed the subject from most of the subtile and over-refined distinctions which had been introduced into it, in the first instance by the followers of Galen, and afterwards by those who adopted the opinions of Solano. He informs us that his object was to direct the attention of the practitioner to "such circumstances of the pulse, in which they could neither mistake nor be misunderstood." He continues: "what I mean is, the quickness or frequency of the pulse, which, although distinguished by some writers, I shall use as synonymous terms." Proceeding upon this principle, he gives us the valuable results of his own observation on the respective frequency of the pulse at different ages and in different states of the constitution, and points out various circumstances in which the frequency of the pulse, considered by itself, without reference to other symptoms, was found to be a very inadequate criterion of the nature and degree of disease.

Nearly a similar view of the subject was taken by Dr. Falconer. Referring to the essay of Dr. Heberden, he has the following remark. "It has been reserved for the good sense and clear understanding of a physician, who does honour to our own country, to free the study of the profession from many needless incumbrances of this kind, and to direct the attention of practitioners to the only circumstance respecting the pulse which is capable of communicating accurate and distinct ideas, or of affording decisive indications." He further agrees with Dr. Heberden, that the quickness and frequency of the pulse are to be regarded as synonymous terms, and characterizes the frequency "as the only circumstance respecting it (the pulse) of which we can form any clear or determinate idea, and which we can be assured conveys the same information to others that it does to ourselves;" while he speaks of the other distinctions as fanciful or whimsical, and as serving to perplex and embarrass the practitioner.

With the greatest respect, however, for these individuals, who may be justly regarded as among the most enlightened and candid physicians of modern times, we conceive that they have attempted to simplify the subject too far, and that, in discarding a mass of erroneous notions, they have fallen into the opposite extreme. But whatever we may think of their opinions on this point, the facts and observations which they have adduced are of the highest importance, and rest upon authority which can never be called in question.

It will be scarcely necessary to pursue the historical part of this article below the termination of the last century, for although we have many very valuable observations on the pulse of a later date, they are either contained in works principally devoted to other topics, such as general histories of medical science, and accounts of particular diseases and individual cases, or they are written for the express purpose of establishing and elucidating some physiological position, which will be more conveniently discussed in the second part of this article.*

* For a more minute account of the opinions respecting the pulse, we may refer especially to the histories of Le Clerc and Sprengel, and to Haller, El. Phys. lib. 6, sect. 2; also to the art. *Pouls*, in the Dict. des Scien. Méd.

II. **Physiology of the Pulse.** — In treating of the physiology of the pulse there are various points that present themselves for our consideration. In the first place we must inquire into the cause of the pulse, and when we have ascertained the cause, we shall be prepared to investigate the exact nature of the effect, and what relation it bears to the other functions of the animal economy.

Since the immortal discovery of Harvey, it is universally admitted that the pulse depends immediately upon the action of the heart, which, by its contraction, expels a portion of blood from its cavities into the great arteries. The contraction, or, as it has been termed, the systole of the heart, must therefore correspond, in point of time, with the stroke of the artery, while, during the diastole of the heart, the artery returns to its quiescent state. But although there can be no difference of opinion on this point, there are various subordinate questions, which have been the subject of warm and protracted discussions, some of which remain still undecided.

Of these, one of the most important is, whether the arteries themselves possess any contractile power, by which they are enabled to co-operate with the heart. The contractile power of the arteries has been supported by direct experiments, and especially by those in which the blood was found to be propelled along the vessels after the heart was removed from the body; while, on the contrary, this property has been denied by other physiologists, because, in experiments made for the express purpose, the artery could not be made to contract by the application of those agents which are known in ordinary cases to stimulate the muscular fibre. There is certainly some difficulty in reconciling the apparently discordant results; but, upon the whole, the weight of evidence is in favour of the contractile power of the arteries; for it appears almost impossible to explain various phenomena without admitting this power, while the negative results that have been adduced against this opinion are explicable upon other principles. We may therefore assume it as an established point, that the blood is propelled along the vessels by the joint power of the heart and arteries.

Proceeding, however, upon this position, that when the heart contracts, a certain impulse is propagated through the artery which causes it to strike the finger, it still remains to be ascertained what is the exact nature of this impulse. We may inquire whether the vessel be actually distended, so as to have its diameter increased, or is it merely extended in length, or displaced? or without having its size actually augmented, or being removed from its situation, is it only rendered more tense or firm, or what other change does it experience? When we estimate the bulk of the blood sent into the aorta at each contraction of the heart, and compare this with the quantity of blood previously contained in the vessels, although we might theoretically suppose that the diameter of any particular artery was actually increased, it must be admitted that the increase of bulk would be much too small to be perceived by the finger, or to produce the sensation which is conveyed to us by the pulse. Hence we may conclude that the terms systole and diastole are scarcely applicable to the different states of the artery; for although we may conceive them to be technically correct, when considered as a question of theory, we cannot admit of their actual existence in any sensible or perceptible degree.

As to the extension or displacement of the artery, it appears certain that when the jet of blood is forcibly projected into a flexible tube, like that of which the artery is composed, there will be an effort produced to straighten it and to diminish its flexures, and at the same time to extend it in a longitudinal direction, as far as the texture of the organ itself and its connection with the neighbouring parts will permit. There is, however, reason to believe that these changes, although they may actually take place to a certain extent, do not exist in sufficient degree to produce all the effect which is experienced, and we are therefore induced to search for some other cause of the phenomena.

The solution of the problem was attempted by Dr. Parry,* who, after proving the insufficiency of all the former modes of explanation, proposed a new view of the subject. We shall quote the words of the author, as they express, in a short compass, the fundamental positions on which the hypothesis rests. "In the larger arteries there is no sensible dilatation or contraction,—therefore the pulse cannot depend on this alternation.—The chief cause of the pulse is a strong and predominant impulse of distension from the systole of the left ventricle, given by the blood as it passes through any portion of an artery forcibly contracted within its natural dimensions." The pulse is felt when the motion of the blood is impeded by the compression of the artery, and it is the resistance to this obstruction which produces the pulse. We feel much disposed to acquiesce in Dr. Parry's opinion, at least it may be asserted that there is no other which gives a sufficient explanation of the phenomena, while at the same time there is nothing in the hypothesis either repugnant to the laws of the constitution, or inconsistent with the structure and properties of the organs in question.

It will follow as a consequence of this opinion, that the pulse must be progressive, i. e. the impulse must be made on the different parts of the artery at different times, corresponding to their distance from the heart. But although this may be theoretically true, it has been questioned whether the difference be really perceptible, and many very accurate observers have not hesitated to affirm that they have been unable to recognise it. There are, however, physiologists of the first eminence, who inform us that they can perceive a difference in point of time in the beat of the different parts of the arterial system. Considering, therefore, that a positive fact, where the authorities are equal, is to be preferred to a negative one, we must admit that the progressive beat of the arteries is perceptible.

Another question which, like the last, must be answered partly from theory, and partly from observation, is whether the force of the different parts of the arterial system always maintains the

* Experimental Inquiry concerning the Arterial Pulse, 1816; with additional experiments by his Son, 1819.

same relation to that of all the other parts, and to the action of the heart. If the action of the heart be increased in a certain ratio, is that of every artery increased in the same ratio, or is the same ratio observed in every increase or diminution of action which may occur in any part of the arterial system? If the heart were the sole impelling power, this equality of ratio must necessarily be preserved; but if the arteries themselves partake of this action, and co-operate with the heart in the propelling power, it will follow that a local cause may produce a local effect; and this we in fact find to be the case.

If we suppose that the arterial system derives its power ultimately from the force of muscular contractility, and that this is exercised conjointly by the heart and the arteries, we may inquire to what change of properties or of constitution are the parts concerned in this operation obnoxious, which may produce an actual or perceptible effect on the pulse; and further, what is the nature of the changes which would be thus produced.

The mechanical structure of the parts we may conceive to remain unchanged, but the force of contractility is perpetually varying. And although we may suppose that the heart and arteries are not under the direct influence of the nervous power, yet we are disposed to acquiesce in the doctrine of those physiologists who maintain that they are indirectly affected by it, in the same manner with the involuntary muscles generally, so that we have here another source of variation in the pulse.

The function of respiration exercises a most important influence over the circulation. The essential object of this function is to produce such a chemical change in the blood as to enable it to maintain the contractility of the muscular parts, and among others, that of the heart itself. Any interruption to this change in the nature and constitution of the blood will necessarily impede the action of the heart, independently of any direct change in its susceptibility, while a still more material change in the circulation will be produced, if both the nature of the blood and the power of the heart be simultaneously affected. The function of assimilation is still more immediately connected with the process of sanguification, and consequently with the quantity and quality of the blood, so that we have here two direct and immediate causes always in operation, which, either separately or conjointly, may contribute to affect the state of the pulse. From these considerations it will appear that, independent of any external agency, we shall have a sufficient number of changes in the powers or actions connected with the circulation, to account for all the actual varieties that are observable in the state of the pulse, and to serve us as a basis on which to construct a theory of the cause and nature of these variations.

Let us now attempt to apply these observations to explain the phenomena of the pulse. We may arrange all its varieties under the three relations of time, force, and equality, considered either simply or in combination. Thus the strokes of the artery may be in the simple relation of frequent or rare, strong or weak, regular or irregular, or we may have the combined relations of frequent and strong, weak and regular, &c. It will be a question, however, for consideration, whether all the varieties that can be actually detected are reducible to these three simple or combined relations; and in order to elucidate this point, it will be necessary to determine what are the characters of the pulse which can be clearly recognised, and are generally allowed to exist.

The first is that which depends upon the simple relation of time, constituting the frequent or rare pulse, indicating merely the number of strokes in a given period. The next variety is the quick or the slow pulse, including something beyond the mere number of beats in a given time, and taking into account the period occupied by each individual pulsation. From what has been stated in the first part of this article, it will appear that it has been questioned by physiologists and physicians, whether it is possible to distinguish between these two states of the pulse, or rather, indeed, whether this difference actually exists; whether, for example, a pulse can be at the same time both rare and quick, or frequent and slow. This point formed the subject of a very warm discussion between the celebrated rivals Stahl and Hoffmann, about the beginning of the last century, the former maintaining the affirmative, and the latter the negative opinion. We have seen above, that the high authority of Heberden and Falconer is in favour of the opinion of Hoffmann, yet we have also high authorities on the other side of the question; and proceeding upon the same principle as on a former occasion, we do not hesitate to decide in the affirmative. It may indeed be impossible to discriminate between a quick and a frequent pulse where the frequency is considerable; yet in cases of less frequency, we conceive that a difference may be detected. These are the only simple relations of time.

With respect to the second class of relations, that of force, we have first the most simple character of strong and weak, depending directly upon the degree of force with which the heart propels the blood into the arteries. It may be doubted whether there be any state of the constitution in which the contractility of the heart is increased or diminished, without the action of the arterial system, taken in its whole extent, being likewise increased or diminished; nor, if this condition should exist, are we in possession of any method of detecting it through the medium of the pulse.

We may conceive a state, in which the contractility of the heart may remain unchanged, but in which the nervous energy may be increased or diminished, in which case an indirect effect may be produced on the pulse, giving rise to two possible variations, the one depending on an increase, the other on a diminution of nervous power. Then again, conceiving the muscular and the nervous powers to be derived from different sources, and not necessarily dependent on each other, we have the farther possible modifications of increased contractility, while the sensibility is either increased or diminished, and the reverse. But although some of these may be regarded as possible and even not unfrequent occurrences, it does not appear that we have any means of recognising their effects on the pulse, or of distinguishing them from each other. The only characters

of the pulse which belong to the relation of strength, besides that of the simply strong and weak pulse, is the hard or soft, and what is perhaps nearly the same, or differing from it by a minute shade only, the quality which has been termed tension, where, without the actual bulk of the artery, or the force of the heart being increased, a sensation is communicated to the finger of great firmness or density. It is probable that under one or other of these characters may be comprehended all the essential variations of the pulse which are connected with the simple relation of force.

[Most of the theories of the pulse take the contractility of the artery too little into account. In pathology, where we have an opportunity for observing the pulse in various phases, we have sensations communicated to the finger which it is difficult to explain upon any theory, except that of the compound action of heart and arteries. The arterial system is manifestly more or less affected by the nerves distributed to it: it may be stimulated by irritants applied to the great nervous centres, or to the nerves passing to it; and this is, doubtless, the cause of many of the modifications of arterial tension which we notice in disease. No inflammation can affect a part of the system, for any length of time, without both heart and arteries participating, and affording unequivocal signs of such inflammation.]

We must next speak of those variations of the pulse which proceed upon the relation of equality. These naturally arrange themselves under the two heads of equality as to time, and equality as to force. The first constitutes the regular or the irregular pulse, and the irregularity may be of two kinds; when one beat among a certain number of strokes is omitted, as in the intermitting pulse, or when the beats generally bear no uniform relation to each other. With respect also to the irregularity of force, we have, in like manner, two varieties; the first, where there is a general inequality in the strength of the pulsations compared with each other; the second, that state of the pulse where a weaker and a stronger beat succeed each other, with at least a certain degree of uniformity. One variety of this has been termed the rebounding pulse, and there are others, much insisted upon by the older writers, and perhaps not altogether without an actual existence, where this change of force is continued through two or three strokes, constituting a kind of increasing or decreasing series, to which the terms *inciduus* and *miurus* (μείουρος) have been respectively applied.

If we now bear in mind the three general causes which we have supposed to affect the circulation, the vital powers of contractility and sensibility, and the state of the circulating fluid, we shall perceive that the relations of time, force, and equality may be, each of them, supposed capable of being influenced by the third of these causes, which will give rise to an additional set of combinations, of possible, perhaps some of them of frequent occurrence. Thus, what is termed the full or small pulse probably depends upon an excessive or a deficient quantity of blood in the vessels. That peculiar state of the pulse in which the sensation conveyed by the artery to the finger has been likened to that of a thread, a wire, or a cord, may be supposed to depend upon the small quantity of blood in the vessel, combined with an increased or diminished contractility of the heart, while the contrary state of a sluggish or an oppressed pulse, and the like, may be attributed to an unusual fulness of the vessels, the vital powers of contractility and sensibility not being increased, or even one or both of them being diminished.

The varieties in the pulse which have been enumerated above, are supposed to be derived from, or to be dependent on, the general or ordinary actions of the animal economy, and to be explicable by a reference to the principles which influence these actions. There are, however, many other variations which profess to be the result of observation and experience, but which are admitted to be altogether empirical, and of which no explanation is attempted to be given. Some of these were referred to in the first part of this article. Such are, for the most part, the different states of the pulse pointed out by Solano and his followers, and especially by Fouquet and Bordeu. The greatest part of these we may unhesitatingly pronounce to be altogether without foundation; there are, however, some of them which are supported by such numerous and learned authorities that it would be improper to pass them by without noticing them a little more particularly.

It has been a favourite notion with many physiologists, ancient as well as modern, that diseases of the different regions of the body, for example, of the upper, the middle, and the lower, might be recognised by corresponding differences in the state of the pulse. But we may venture to assert that this doctrine is erroneous. The mere local situation of a disease can have no effect on the pulse, except as far as regards the distance of the organ from the centre of the circulation; while, on the contrary, wherever the morbid part be situated, it is easy to imagine that the function to which it is subservient, or even its texture and composition, may materially affect the condition of the circulation, and that this may possibly be detected by the state of the pulse. Antecedently to all experience on the subject, we might expect that an inflammation of any part connected with the brain or an organ of sense would produce a different effect upon the pulse from an inflammation of the lungs, and this again from a similar affection of the stomach or the intestines. We may farther conceive that an inflammation of a mucous, a serous, a muscular, or a membranous texture, would respectively impress a specific character on the circulation, as manifested by the pulse; but this will be altogether independent of the mere locality of the organ, and must be referred to a totally different principle. The idea which was long prevalent of there being a connection between the diseases of each side of the body and the pulse of the same side, would appear, in like manner, to be entirely without foundation.

There is, however, another set of causes which materially affect the pulse; these may be divided into internal and external. The internal are connected with the original powers or constitution of the body, or with its natural and ordinary progressive changes. Such are age, sex, temperament, and peculiar idiosyncracies, the states of sleep and watching, of repletion and inanition,

mental emotions of all kinds, and the revolution of the diurnal period. All the above are within the limits of health, and the catalogue is to be augmented by the long and melancholy train of morbid affections. Among the external causes are climate, temperature, various atmospherical changes, peculiarities of dict, modes of life, certain occupations and acquired habits. All these circumstances more or less affect the pulse, and cause it to deviate from what may be regardcd as its medium or standard condition, and they are all of them objects of especial attention to the judicious and intelligent physician. The further consideration of these may, however, be more conveniently referred to the third division of this article.

III. **Pathology of the Pulse.**—After having made ourselves acquainted with the physiology of the pulse, we shall be prepared for entering into the consideration of its pathology, and for inquiring into the degree in which it may serve us as an indication of the nature and seat of disease.

We have had ample occasion to remark upon the great difference of opinion that has existed on this latter point among the most eminent men both in ancient and modern times. While Hippocrates and Celsus paid but little attention to the indications of the pulse, Galen, on the contrary, fell into the opposite error, and aimed at what was considered, even by some of his contemporaries, as an excessive and over-refined minuteness. Among the moderns, the prevailing disposition has been to regard the pulse as one of the most important means of ascertaining the nature and progress of disease; and it may be asserted generally, that the pulse is among the first objects to which the practitioner directs his attention. Yet even among the most enlightened and candid of the moderns, we have opinions promulgated which must diminish the confidence we might otherwise be disposed to feel on this subject. We have seen above, that Dr. Heberden limits the characters of the pulse, which are available by the practitioner, almost to its different degrees of frequency; and with respect to its indications generally, the tendency of his observations is to show that the pulse is, in many cases, a very inadequate guide in enabling us to form our indications, and that not unfrequently it would lead us to absolutely erroneous conclusions.

In this state of uncertainty it may be useful to recur to first principles, and to endeavour to unite theory with experience and observation. If there be a state of the system in which the muscular contractility and the nervous energy are one or both of them increased, we might expect that an increased action of the heart would be the consequence, and that this increased action would be communicated to the arteries, and would, according to circumstances, produce a full, a hard, a frequent, or a quick pulse, or any combination of these conditions. If, on the contrary, the force of the heart be diminished, either directly by the diminution of its contractility, or indirectly by that of the nervous influence, the blood will be propelled with less force into the arteries, and will be moved with less facility along them. The pulse will then become languid or oppressed, feeble, small, intermitting, or irregular, according to the quantity of blood in the vessels, and the relation of this to the vital powers.

Proceeding, then, upon the united basis of theory and observation, it may be useful to consider, first, what characters of the pulse are the most distinctly perceived and clearly discriminated; and, secondly, to inquire what conditions of the vital powers or of the functions may be supposed capable of producing a distinct and specific change in the state of the pulse.

But before we proceed to examine into the relation which these various states of the pulse bear to the different morbid conditions of the body, it will be proper to offer a few brief remarks on the effect of the circumstances alluded to above, which, independently of disease, are supposed, in a greater or less degree, to influence the circulation.

The first in point both of order and of importance is the age of the subject. The pulse of a newly-born infant is 130 or 140 in a minute, nearly twice as frequent as that of an adult; but its frequency soon begins to diminish, its mean rate during the first month being about 120. During the first year it falls to about 110; during the second year to about 100; from the third to the sixth year it may be estimated at about 90; and by the tenth or twelfth year it arrives at the state in which it remains for the greatest part of life.

[More accurate observations have indicated conditions of the pulse in the different ages that had been overlooked. In infancy, it is generally irregular and always rapid; and in old age, contrary to the views generally embraced, it often certainly becomes more rapid than in the adult. Researches by MM. Hourmann and Dechambre (*Archiv. général. de Médecine*, 1835) on 255 women, between the ages of 60 and 96, have shown the average number of the pulse to be 82-29. M. Rochoux, however, (art *Pouls*, in *Dict. de Méd.* 2d édit. xxv. 614, Paris, 1842; see also Piorry, *Traité de Diagnostic*, § 555,) still considers that, as a general rule, the pulse diminishes in frequency in the progress of age; and the same inference has been drawn, it will be seen, by Dr. Knox. It is important, also, to remark, that Dr. Gorham (*Lond. Med. Gaz.* Nov. 25, 1837,) found the mean number of the pulse, from five months to two years old, to be 130; and 107.63 from two to four years old; from which time until the 10th year, the number continues almost the same. Unless these facts be borne in mind, that velocity of the circulation, which is healthy, may be regarded as morbid. (See, on this subject, Trousseau, in *Journ. des Connaiss. Méd. Chir.* Juillet and Août, 1841, or *Amer. Journ. of the Med. Sciences*, Oct. 1841, p. 458, and Jan. 1842, p. 199.)]

Numerous observations have been made for the purpose of fixing the average rate of the pulse in the healthy adult. This subject was particularly attended to by Dr. Falconer, and we find in his essay a copious collection of observations made by himself and others, in order to ascertain this point; the number which he fixes upon is 75, and there appears sufficient ground for acquiescing in his conclusion. It is further to be remarked that the pulse is more irritable in youth than in more advanced age, being more affected both by external and internal causes.

With respect to the two sexes, it is generally

admitted that the pulse of the female is more frequent than that of the male, perhaps eight or ten beats in the minute; it likewise resembles the pulse of youth in its liability to be affected by all those circumstances which influence the state of the circulation. An analogous observation may be made with respect to temperaments; in the sanguine temperament, where the constitution more resembles the state of youth and of the female, the pulse is more frequent and more irritable than in that of an opposite character. With respect to idiosyncrasies, it is obvious that no general remarks can be made; but it is important for the practitioner to be aware that individuals, who may resemble each other in all that respects age, sex, or temperament, may still have a different rate of the pulse, and this independent of any apparent morbid condition or assignable cause.

[In some individuals in health, the number of beats is singularly few. The pulse of a healthy adult, known to the author, was, on the average, 36 per minute. Not unfrequently, on the other hand, it exceeds 100 in health. Strange to say, the pulse has been known to be wholly absent, without the health being interfered with. Such a case has been related by Professor Jackson, of Philadelphia, (*Principles of Medicine*, &c. p. 492, Philad. 1832); and for other cases, see the writer's *Human Physiology*, ii. 164.)]

The states of sleep and watching, and more generally of rest and motion, very considerably affect the pulse. The observations that have been made on the pulse during sleep are not altogether uniform, but they tend generally to the conclusion, that the pulse becomes slower during this state. With respect to the effect of motion, every one is aware how much the pulse is increased in frequency by exercise of any kind; the degree of this increase being partly in proportion to the degree of exercise employed, and partly to the previous state of the constitution or the ordinary habits of the individual. On this subject, as well as on many other points connected with the mechanism of the pulse, we have a number of valuable observations by Bryan Robinson, a writer whose facts appear to be correct and worthy of our attention, although his physiological hypotheses are, for the most part, discarded. (Treatise on the Animal Economy, 1732.)

[Dr. Guy (*Guy's Hospital Reports*, April, 1838, p. 92. See, also, Dr. John M. B. Harden, in *Amer. Journ. of the Med. Sciences*, for April, 1843, p. 340), from numerous observations, found the pulse in healthy males, of the mean age of 27 years, in a state of rest, 79 when standing, 70 sitting, and 67 lying; the difference between standing and sitting being 9 beats; between sitting and lying, 3 beats; and between standing and lying, 12 beats. When all exceptions to the general rule were excluded, the numbers were,—standing 81; sitting 71; and lying 66,—the difference between standing and sitting being 10 beats; between sitting and lying 5 beats; and between standing and lying 15 beats. The effect produced upon the pulse by change of posture, Dr. Guy ascribes to muscular contraction, whether employed to change the position of the body or to maintain it in the same position. In children the difference between the pulse in the sitting and lying posture is often very marked. In a boy, six years of age, the writer found it to amount to fifteen beats; and Dr. Evanson (*Treatise on Diseases of Children*, by Drs. Evanson and Maunsell, Amer. edit. by Dr. Condie, p. 19, Philad. 1843) states, that he has often found the pulse,—which at night, during sleep, was 80, full and steady—up to 100 or even 120 during the day, small and hurried, and this in children six or seven years of age, and in perfect health.]

The state of the system with respect to repletion or inanition very materially affects the pulse. The taking of food increases both its frequency and its fulness, and that often in a very considerable degree. After a meal which cannot be regarded as excessive or intemperate, the pulse may be increased by one-fifth of its average number of beats, while its strength and fulness are almost equally augmented. When abstinence is carried to a great and unnatural excess, the pulse, although much diminished in strength, appears to be increased in frequency; but this occurrence can seldom be observed without the presence of some other disease, which is the immediate cause of the abstinence, and which would probably of itself affect the pulse.

Every one is aware how much the circulation is affected by mental emotions of all kinds. If we arrange them, according to the ordinary distribution, under the two great classes of exciting and depressing, we shall find that they, each of them, increase the frequency of the pulse; the former, however, for the most part, have the effect of also increasing its force, while the latter, on the contrary, render it more feeble.

It is generally admitted that the pulse undergoes a kind of periodical revolution during the course of the day, and this independent of any of those circumstances, external or internal, which might be supposed to affect it. This subject has been attended to by various physiologists, and among others by Bryan Robinson and Falconer, who have given us tables of the results of their observations. We are, however, scarcely able to draw any conclusions from them, except that the pulse is less frequent in the morning, and that it has a general disposition to become more frequent as the day advances; but it appears very difficult, if not impossible, to determine in what degree this increased quickness is to be attributed to food, exercise, or to other exciting causes.

[From observations made by Dr. Knox (*Edinb. Med. and Surg. Journ.* April, 1837), he has drawn the following deductions on this subject, which accord greatly with those of Dr. Guy on the same subject (*Ibid.* Jan. 1841, p. 90): 1. The velocity of the heart's action is in a direct ratio with the age of the individual,—being quickest in young persons, slowest in the aged. There may be exceptions to this, but they do not affect the general law. 2. There are no data to determine the question of an average pulse for all ages. 3. There is a morning acceleration, and an evening retardation in the number of the pulsations of the heart, independently of any stimulation by food, &c. 4. The excitability of the heart undergoes a daily revolution; that is, food and exercise affect the heart's action most

in the morning, and during the forenoon, least in the afternoon, and least of all in the evening. Hence it must be inferred, that the pernicious use of spirituous liquors must be greatly aggravated in those who drink before dinner. 5. Sleep does not farther effect the heart's action than by a cessation of all voluntary motion, and by a recumbent position. 6. In weak persons, muscular action excites the action of the heart more powerfully than in strong and healthy individuals; but this does not apply to other stimulants, to wine for example, or to spirituous liquors. 7. The effects of the position of the body, in increasing or diminishing the number of pulsations, is solely attributable to the muscular exertion required to maintain the body in the sitting or erect attitude: the debility may be measured by altering the position of the person from a recumbent to a sitting, or to the erect position. 8. The most powerful stimulant to the heart's action is muscular exertion. The febrile pulse never equals this.]

We are still less able to draw any general conclusions respecting the operation of the external causes, which were enumerated above as liable to affect the pulse; it is less easy to observe their distinct and separate action on the system, and it may be apprehended that the operation itself is in most cases less uniform. If there be any exception, it is with respect to external temperature, which seems very generally to increase the frequency, and in most cases the strength and fulness of the pulse. Temperature, however, like all other stimulating agents, if carried beyond certain limits, either as to quantity or duration, exhausts the vital powers, and produces a state of weakness, which may be recognised by the pulse. Excessive cold exercises a directly debilitating power over the system, and produces a corresponding effect on the pulse. There is, however, a considerable diversity in the accounts which we have on this subject, in consequence of the difficulty there is in ascertaining the point at which cold may be considered as exceeding the limits of the salutary action which it exerts when in a moderate degree only. With respect to the other external causes which affect the pulse, we may remark that they are all of them points to which the practitioner should direct his attention, in order that he may learn to distinguish between the effects which proceed from these causes, and those which belong to the diseases under treatment.

To return from this digression to consider the characters of the pulse, the following may be enumerated among those which are the most distinct and unequivocal. In the relations of time, the pulse may be frequent or rare, quick or slow; in the relations of force, it may be strong or weak, hard or soft, full or small, free or compressed: in the third relation, of equality, we have the irregular pulse with respect both to time and force, with the varieties of each, the intermitting, the rebounding, the fluctuating or wavering pulse, &c.

In considering the changes that may be communicated to the pulse by a change in the action of the heart, we may remark that, of the two vital powers which contribute to this action, the nervous power is the one the most liable to variations, and the most under the influence of external agents; we therefore assume that, in most cases of increased or diminished action, the change originates in an affection of the nervous system. It hence becomes necessary to consider what are the laws which regulate the actions of the nervous system—at least what are the changes in this action which are especially applicable to the case in question. Now there are two states of the nervous system recognised by physiologists, which must influence the action of the heart in such a way as to affect the frequency of the pulse; the first condition, which has been termed the increased mobility or excitability of the nervous system, the other a sedative operation, tending directly to diminish its action. The effect of the increased mobility of the nervous system is to render a part under the influence of the nerves more susceptible of action, while the force of the action is not proportionably increased; the operation of a directly sedative agency is to diminish the action of the parts in all respects, both as to susceptibility and to force. The diseases of hysteria and apoplexy, or rather the tendency to these diseases, may be cited as affording us, respectively, types of these two states of the nervous system; the former giving rise to frequent and irregular contractions of the muscles, the latter tending altogether to destroy their contractility. Hence we observe a foundation for what at first view might appear a contradiction, that a debilitating cause, acting on the heart, may in one case cause an increased, and at another time a diminished frequency of the pulse.

It is generally admitted by physiologists, that a principle analogous to what has been described as occurring in the nervous system exists also in the muscular; that absolute force and susceptibility of action bear no necessary relation to each other, but that each of them may be increased or diminished without a corresponding change in the condition of the other. With respect to the pulse, however, it is admitted that we are, for the most part, unable to distinguish between the affections of the muscular and the nervous systems; consequently all that we can aim at is to ascertain in what manner or in what degree the morbid cause acts generally upon the powers which increase or diminish the susceptibility or force of the contractions of the heart.

It will be scarcely necessary to offer any remarks on the mode of feeling the pulse. We have, indeed, in some of the older writers, many minute directions on this subject, and in some French works, even of recent date, the "exploration" of the pulse is treated of in detail, as an elaborate art of difficult attainment. It no doubt requires accurate observation and minute attention to appreciate all the changes to which the pulse is liable, but there appears to be nothing in the subject of peculiar difficulty, or which will not be overcome by a due familiarity with the phenomena of disease. The anatomical structure of the part, and its practical convenience, render the artery at the wrist, in a great majority of cases, the most eligible part for ascertaining the state of the pulse; we may occasionally find it necessary to examine the artery in the neighbourhood of a part which is supposed to be the immediate seat of the disease, and in some instances we compare the action of

different arteries with each other; but these are points which scarcely require or admit of general directions.

What has been stated above bears immediately upon the second point which we proposed for consideration, viz. to inquire what condition of the vital powers or of the functions may be supposed capable of producing a distinct and specific effect upon the pulse, and what are the diseases which derive their distinctive characters from the changes consequent on these conditions. Now we shall find that the diseases in which the action of the heart is more immediately or directly concerned are those which we referred to the great class of febrile affections. These may be arranged under the two divisions of fevers that originate in, or are essentially connected with, increased action of the vital powers, and those which originate in a diminished action of these powers; the first constituting what is popularly termed inflammatory fever, the synocha or cauma of systematic writers; the latter the low or nervous fever, the typhus of the nosologists. If to these we add a third class of diseases, which depend upon a directly sedative operation on the nervous system, nearly corresponding to the anæsthesiæ of the nosologists, we shall have three great divisions, to which we may refer all the various changes in the state and condition of the pulse which can be easily reduced to any general principles.

We are now arrived at that part of the subject to which all the rest ought to be subservient, and which alone gives it its value—the practical application of our theoretical principles; yet, important as it is, on this occasion it must necessarily be passed over with a very slight notice. All that can be accomplished in an essay like the present, is to establish and illustrate certain general positions, which may be applicable to each particular disease, or even to each individual case,—a detail which would be inconsistent with the nature and the limits of our article, but which will be amply supplied by the other parts of this work.

The object of the practitioner is to ascertain, if possible, in the first instance, what is the ordinary state of the pulse of each individual, as depending upon his peculiar constitution or habits; and, secondly, how it may be supposed to be affected by the circumstances, either external or internal, which were enumerated above, and which are independent of the disease in question. In the third place, he must ascertain the state of the pulse with respect to its three principal relations of time, force, and equality, considered either simply or in combination, and endeavour to trace their connection with the supposed cause of the disease, and with the derangement which has been induced in the various powers and functions of the system. These he will probably find it convenient to refer to one or other of the three great classes mentioned above, and he must regulate his practice, and form his diagnosis and prognosis by still farther viewing them in connection with the other symptoms of the disease. The result of this process will be, that by referring to the physiological principles which we have attempted to establish, the practitioner will frequently be enabled to explain what would otherwise be obscure and unintelligible; yet it must be acknowledged, on the other hand, that he will meet with numerous anomalies which he will find it impossible to reduce to his system, and which can only be duly appreciated by a careful and diligent observation of the phenomena of disease, and by steadily preferring the result of experience to the deductions of any theory, however plausibly formed or ingeniously supported. [See on the whole subject of the pulse, Piorry, *Traité de Diagnostic*, § 537.]

John Bostock.

PURGATIVES.—See Cathartics.

PURPURA.—The terms *purpura*, [or *porphyra*] *purpura hæmorrhagica*, and *hæmorrhœa petechialis*, are employed to denote that affection which was formerly distinguished in medical writings by the designations of morbus maculosus hæmorrhagicus, petechiæ sine febre, phœnigmus petechialis, (*Sauv.*) &c. This disease is characterized by an efflorescence on the skin, occurring independently of primary fever, consisting of red, purple, or livid spots of various sizes, (termed petechiæ, vibices, and ecchymoses,) and in its more severe form accompanied by hemorrhage from various parts of the body, chiefly from the mucous membranes. The spots are seldom elevated above the level of the surrounding cuticle; they are unattended by itching or any uneasy sensation; and on division of the cuticle by a scalpel they are found to consist of minute effusions of blood. They are therefore essentially different from every form of rash or other cutaneous eruption; and are properly considered as the result of a *cutaneous hemorrhage*.

[In consequence of the appearance of the skin, purpura has been commonly classed amongst cutaneous diseases. Willan has treated, under the head of purpura, of the land-scurvy, and of the petechial spots of malignant fever,—*petechia contagiosa;* yet he has omitted sea-scurvy,—an affection almost identical with land-scurvy. They are all—as a general rule—dependent upon a similar depraved condition of the fluids and solids; are true cachexies, in other words; and have accordingly been treated of, by the writer, under Scorbutic Cachexia. (*Practice of Medicine*, 2d edit. ii. 632, Philad. 1844.)]

Petechiæ (a name introduced into nosological language from the Italian *petecchia*, and supposed to be originally derived from their resemblance to flea-bites) have been long noted as a symptom in continued fevers and other febrile diseases, in which they have been supposed to indicate peculiar malignancy. (See the article Fever.) From their constant occurrence in certain epidemic fevers, these were considered as constituting a specific exanthematous disease, which was described in nosological systems and practical writings under the names of petechiæ, febris petechialis, febris purpurata, &c. The occurrence of petechiæ in continued fever, no less than in small-pox, measles, &c. is now universally allowed to be a contingent symptom, and most commonly arises from the influence of foul air, a hot regimen, the neglect of purgatives, or similar errors in treatment. It is accordingly much less frequent than formerly. *Petechial fever* is the "purpura" of Sauvages' nosology; a term which had previously been used

in the same sense by Riverius, Diemerbroeck, &c. By others of the old writers it had been employed to signify affections totally different, viz. various forms of papulous eruptions and rashes, as red-gum, lichen, miliaria, nettle-rash, measles, and scarlatina. (Willan on Cutaneous Diseases, p. 452.—Bateman, Synopsis, p. 103, third edit.) We must therefore take eare not to apply their observations to what is now termed purpura.

We owe the name of purpura in its present acceptation to Dr. Willan. In his nomenclature of cutaneous affections it is used as a generic term, to include every form of petechial eruption, febrile or non-febrile. He therefore includes under it, as a species, purpura *contagiosa*, the petechial eruption in continued fevers; a name every way objectionable, as it would tend to perpetuate the ancient errors of the idiopathic nature and specific contagion of those petechiæ. Under the names of *P. simplex*, *P. hæmorrhagica*, and *P. urticans*, he describes "three striking varieties" of petechial eruption independent of primary fever,—varieties which confessedly differ chiefly in degree, and which, under the general name of purpura, form the subject of the present article.

Purpura, considered by Willan as an affection of the skin, was ranked by him under the order "Exanthemata," or rashes, of his arrangement; to which it bears some affinity in external appearance only, but even in this respect does not agree with his definition of the order. Rayer has more correctly classed purpura (under the somewhat quaint name of hémacélinose,—from *αἷμα*, *blood*, *κήλις*, *spot*, *νόσος*, *disease*; *Rayer*, Malad. de la Peau, t. ii. p. 158,) under "Cutaneous and Subcutaneous Hemorrhages." But purpura cannot be correctly considered as merely a cutaneous disease, since, as Dr. Watson has well observed, "the effusion of blood (which, strictly a hemorrhage in all parts, takes the form of red or purple spots where the quantity effused is but a drop) is not confined to the skin nor to the subcutaneous tissues, but is observed occasionally on the internal surfaces also, and in the parenchymatous surface of the viscera. The disease, therefore, is properly a hemorrhage, but it is not properly, or merely, a cutaneous hemorrhage."

Purpura, considered as a hemorrhagic affection, is a most interesting subject of pathological inquiry, and demands peculiar attention from the danger which attends it, and from the obscurity which attaches to its nature and mode of cure. It has, therefore, ever since it was first distinguished from typhoid fever, attracted much notice from medical writers. For its earlier literary history, the reader must be referred to Dr. Willan's work, where he will find it amply detailed. Reference to the old writers can be of little avail for pathological and practical purposes. The first systematic account of the disease, under the name of hemorrhœa petechialis, was given in this country by Dr. Adair, in his thesis published in 1789. Dr. Bateman, in his inaugural dissertation published in 1800, described it under the same appellation. The description of purpura by Willan in his Reports of the Diseases of London, and subsequently in his great work on Diseases of the Skin, is given with his usual perspicuity, but he was practically unacquainted with the severer cases of the disease, never having met with one which proved fatal. He considered the disease as nearly if not quite identical with scorbutus, and to be combated by similar remedies. These views were disputed by Dr. Parry and Dr. Harty, and were considerably modified by Dr. Bateman in his Synopsis. Since that period a succession of valuable and instructive cases have been published in the Edinburgh Medical and Surgical Journal, and a few in other periodical works.* Yet much remains to be done ere the pathology of purpura or its treatment can be considered as satisfactorily fixed on scientific principles.

Phenomena of the disease.—These may be referred to—1. appearances on the skin; 2. hemorrhages; 3. constitutional symptoms; 4. progress and duration of the disease; 5. circumstances noticed respecting the blood and the urine; 6. morbid appearances on dissection.

1. We have already given a general description of the efflorescence on the skin characteristic of purpura. There are three different forms of it, (well represented in plates xxviii. and xxix. of Bateman's "Delineations,") viz. the P. simplex, P. hæmorrhagica, and P. urticans of Willan. The *P. senilis* of Bateman (figured in his 30th plate) is a nearly local form of ecchymosis, unattended with fever, hemorrhage, or other constitutional symptoms; we shall therefore refer to the "Delineations," and to the third and subsequent editions of the "Synopsis," for his account of it.

In the *purpura simplex*, the petechiæ are described by Willan and Bateman as occurring with little constitutional disorder. "They are most numerous on the breast and on the inside of the arms and legs, and are of various sizes, from the most minute point to that of a flea-bite, and commonly circular. They may be distinguished from recent flea-bites partly by their more livid or purple colour, and partly because, in the latter, there is a distinct central puncture, the redness round which disappears on pressure." (*Bateman*, Synopsis, p. 104.) Purpura simplex is chiefly noticed in women and delicate children. It is thus described by Heberden:—"Cutis puerorum interdùm ubique distinguitur maculis purpureis, similibus earum quæ in febribus naseuntur. Tamen cum his adversa valetudo nulla est, neque præcessit, neque subsequitur. Aliæ *pustulæ* (seil. maculæ) vix sunt semine milii majores, aliæ sunt tres polliees amplæ. Post paucos dies cunetæ, sine medicamentorum auxilio, suâ sponte plerumque recedunt. In quodam puero sic affecto, si modò digitus leviter cuti imprimeretur, continuò sanguis

* *Duncan* (senior), Medical Cases, Edin. 1781, p. 90.—*Rogert*, Acta Soc. Reg. Med. Hafn. tom. i.—*Adair*, Diss. Inaug. Edin. 1781.—*Ferris*, Med. Facts and Observat. 1781.—*Tattersall*, Med. Comment. vol. xx. (1795.)—*Walker*, Annals of Med. vol. ii. (1797.)—*Bateman*, Diss. Inaug. 1800.—*Willan*, Reports on Diseases of London.—Willan on Cutaneous Diseases.—Bateman's Synopsis.—Bateman's Reports on Diseases of London.—*Parry*, Edin. Med. Journ. v. 7. *Bateman*, ibid. vi. 224 and 374.—*Jeffreys*, ibid. viii. 435.—*Walsh*, ibid. ix. 161.—*Harty*, ibid. ix. 186.—Ibid. xiii. 402.—*Combe*, ibid. xvii. 83.—*Johnston*, ibid. xviii. 402.—*Duncan* (junior), ibid. 405.—*Nicholl*, ibid. xviii. 540.—*Darwall*, ibid. xxiii. 53.—*Magee*, ibid. xxiv. 307.—*Kift*, ibid. xxvii. 71.—Blackall on Dropsies, p. 150.—*Yeats*, Medical Transactions, iv. 429.—*Gairdner*, Edin. Medico-Chirur. Trans. i. 671.—*Wood*, ibid. 680.—*Fairbairn*, ibid. ii. 157.—*Latham*, Med. Gazette, i. 544.—*Watson*, ibid. vol. vii.—Mackintosh's Pract of Physic, vol. ii.—*Rayer*, Malad. de la Peau, tom. ii. p. 168.

ex vasis vicinis exiit, et sugillatio, tanquàm in collisis, facta est." (*Heberden*, Comment. cap. lxxviii. de maculis purpureis.) The latter circumstance is more frequently noticed in the next form of the disease.

In *purpura hæmorrhagica* "the petechiæ are often of a larger size, and are interspersed with livid stripes and patches, resembling marks left by the stroke of a whip, or by violent bruises. They commonly appear first on the legs, and at uncertain periods afterwards on the thighs, arms, and trunk of the body, the hands being more rarely spotted with them, and the trunk generally free. They are usually of a bright red colour when they first appear, but soon become purple or livid; and, when about to disappear, they change to a brown or yellowish hue; so that, as new eruptions arise, and the absorption of the old ones slowly proceeds, this variety of colour is commonly seen in the different points about the same time. (See Delin. plate xxviii. fig. 2.) The cuticle over them appears smooth and shining, but is not sensibly elevated: in a few cases, however, the cuticle has been seen raised into a sort of vesicles, containing black blood.... The gentlest pressure on the skin, even such as is employed in feeling the pulse, will often produce a purple blotch like that which is left after a severe bruise." (*Bateman*, Synopsis, p. 105.) The nature and seat of the small effusions of blood which constitute the petechiæ, from which the vibices and ecchymoses differ chiefly in magnitude, are well explained by the anatomical researches of Rayer. "On dissecting the skin," he observes, "it is found that the petechiæ and ecchymoses do not all occupy the same situation. Some are very superficial, and seated on the surface of the rete mucosum; others occupy the alveoli of the cutis; the largest and darkest-coloured have their seat under the skin in the cellular tissue. In these the blood is found coagulated, but it is fluid in the smaller and more superficial effusions. The vascular ramifications contiguous to these minute ecchymoses are in their natural state. The blood is easily removed by washing or maceration." (*Rayer*, Malad. de la Peau, ii. 162.)

The variety termed by Willan and Bateman *purpura urticans*, is comparatively rare. It is characterized by "rounded and reddish elevations of the cuticle, resembling wheals, but which are not accompanied, like the wheals of urticaria, by any sensation of itching or tingling." These little tumours gradually dilate; but within twenty-four hours or somewhat longer, subside to the level of the neighbouring cuticle. They are commonly situated on the legs, where they are intermixed with petechiæ; (see Delineat. plate xxix.;) they also appear on the thighs, breast, arms, &c. The spots are not permanent, but fade, while others appear in succession in different places. The duration of the complaint varies from three to five weeks. Willan never observed it to be attended with hemorrhage or fever; he states that it generally occurs in summer and autumn, and attacks those who are exposed to daily fatigue, &c., or young women who live luxuriously and take little exercise. Some œdema of the extremities usually accompanies it, and it is occasionally preceded by stiffness and pain in the legs. (Willan on Cutaneous Diseases, p. 461.—Bateman's Synopsis, p. 116.)

2. The hemorrhages attendant on purpura take place from the mouth, nostrils, bronchial tubes, stomach, intestines, bladder, uterus, — in short, from every part of the mucous membranes. They also in some cases occur from the skin; at least this singular hemorrhage bears in some cases a close analogy to purpura. In all these cases the effect produced on the system is from the loss of blood; but where the hemorrhage is strictly internal, as from the serous membranes or the parenchymatous substance of the viscera, the mischief is done by the mechanical compression or destruction of the texture of organs essential to life. Both cerebral and pulmonary apoplexy may thus occur and destroy the patient; of which there are several cases on record.

The most frequent hemorrhage, particularly in weak subjects, and where there is an approach to what has been termed the scorbutic diathesis, is that from the mouth. The gums are tender, and easily bleed on being touched. The lining membrane of the inside of the lips and cheeks, the investing membrane of the tongue, and also in some cases that which covers the tonsils and contiguous parts, present dark-coloured spots, which are usually elevated and distended with blood, which they pour out either spontaneously or on the slightest pressure. In some very unfavourable cases, as that related by the late Dr. Duncan, (Edinburgh Med. Journal, vol. ix. p. 405,) these spots degenerate into gangrenous ulcerations.

The tendency to the several kinds of hemorrhage varies at different periods of life: according to Rayer, epistaxis is the most common in children, as might be expected; uterine hemorrhage in women; and pulmonary or intestinal hemorrhage in male adults. The quantity of blood lost is often very considerable; and, as in other cases of hemorrhage, it is very apt to recur, and to become periodical. A case is mentioned where it returned daily at the same hour for a considerable period.

3. We have already stated that the constitutional symptoms are usually but slight in the varieties of the disease termed P. simplex and P urticans. In both of these forms, occurring without hemorrhage, considerable febrile excitement has been observed in some cases. With regard to P. hæmorrhagica, the following account of the preceding and accompanying symptoms is given by Bateman: "This singular disease is often preceded for some weeks by great lassitude, faintness, and pains in the limbs, which render the patient incapable of any exertion; but not unfrequently it appears suddenly, in the midst of apparent good health. It is always accompanied by extreme debility and depression of spirits; the pulse is commonly feeble, and sometimes quickened; and heat, flushing, perspiration, and other symptoms of slight febrile irritation, recurring like the paroxysms of hectic, occasionally attend. In some patients, deep-seated pains about the præcordia, and in the chest, loins, and abdomen, have been felt. In others, a cough has accompanied the complaint, or tumour and tension of the epigastrium and hypochondria, with tenderness on pressure, and a constipated or irregular state of the

bowels. But in many cases no febrile symptoms have been noticed; and the functions of the intestines are often natural. In a few instances frequent syncope has occurred. When the disease has continued some time, the patient becomes sallow, or of a dirty complexion, and much emaciated; and some degree of œdema appears in the lower extremities, and afterwards extends to other parts." (*Bateman*, Synopsis, p. 107.) This is a very faithful general account; but in several of the cases which have been recorded, the febrile symptoms, and those indicative of internal affections of the congestive or inflammatory kind, have been much more considerable than we should collect from Dr. Bateman's statement. Such affections are considered by Rayer as always constituting an "accidental complication" of purpura; and he says that it is only in such cases of accidental complication that he has seen it present the characters of active hemorrhage. (Op. cit. ii. 167.) On the other hand, it is to be observed that the mode of treatment which has been directed to the relief of the internal symptoms, has in several well-marked cases procured the cessation of those proper to purpura; an effect which has also not unfrequently occurred from a profuse eruption of the catamenia, (*Bateman*, Reports of Diseases of London, p. 130,) or from a hemorrhage which has appeared to be, in the language of the schools, critical. This subject, however, will more properly come to be considered under the heads of pathology and treatment.

4. "The purpura hæmorrhagica," observes Willan, "has not any regular or stated termination. It was protracted, in the cases under my own observation, from fourteen days to twelve months and upwards. The disease did not, in any of these cases, prove fatal." (Op. cit. p. 457.) In some cases the disease has proved fatal from internal or external hemorrhage, or the violence of the febrile symptoms, or prostration of the vital powers, in a shorter time, considerably, than the former period mentioned by Willan. In others it has assumed a completely chronic form, and either recurred periodically, or as to some of its symptoms been more or less constantly present. Several well-attested cases are recorded where it has appeared to be linked in an inexplicable manner with the mode of existence of the individual, and put on the character of what are properly called "constitutional hemorrhages." (See Hemorrhage.) In such cases, it has existed for years without impairment of the general health. A boy is mentioned by Bateman on the authority of the elder Dr. Duncan, whose skin for several years was constantly covered with petechiæ, and exhibited vibices or purple blotches on the slightest blow; yet he was in other respects in good health, and capable of active exercise. Pulmonary hemorrhage at length supervened, and carried him off. (Synopsis, p. 108.) A case is related by Adair, where the symptoms of purpura recurred regularly for six succeeding summers. (Diss. Inaug. p. 16.)

5. We have not been able to meet with any account of the chemical analysis of the blood in a case of purpura. Its sensible qualities, however, and mode of coagulation have been carefully noted in several cases. Dr. Watson asserts that "in many, perhaps in all instances of the disease, in which it can be examined, the blood is found actually to have undergone a change, and not merely a change which may be ascertained by nice or elaborate chemical research, but such an alteration of its sensible qualities as is evident to the eye, and forces itself upon our notice." (Watson's Lumleian Lecture, Med. Gazette, vol. x. p. 499.) The inquiry into the state of the blood is certainly one of the highest interest, both with regard to the pathology of this disease in particular, and as it bears upon the general doctrines of pathological science. But in pursuing it we must be careful to keep in view the causes which, independently of any primitive alteration in the state of the blood existing as the cause of all the phenomena of purpura, may materially affect the condition of that fluid. The coexistence of fever or inflammation will, of course, give rise to those alterations in the blood which are proper to those morbid states; accordingly we find it stated by Dr. Parry, that in both his cases the blood was highly buffed, the crassamentum firm and cohesive, but bearing a small proportion to the serum.* In other cases where the blood has been examined, there had previously occurred either very profuse or long-continued hemorrhage, which necessarily altered the quality of the blood by diminishing the quantity of the red globules as well as of the fibrine of the blood in proportion to the serum. Our conclusions ought, if possible, to be derived from the examination of blood drawn at the height of the disease, when no excessive hemorrhage has preceded, and in cases where there are no decided marks of inflammation or other disease coexisting with purpura.

Some of the most remarkable results of the examination of the blood in purpura have been the following. In the case of a sea-captain, a plethoric subject with a full pulse, the state of the blood obtained by a *second* venesection, and when purgatives had been prescribed, and two pounds of blood previously lost by epistaxis, is described by Dr. Jeffreys as follows: "The blood drawn yesterday shows an inflammatory buff on its surface, at least an inch and a half in thickness, firm and yellow, far exceeding any thing I ever saw in rheumatism or pneumonia, but not at all cupped; in fact, the whole serum looks like a corrupted coat of coagulable lymph. The crassamentum appears in a very dissolved state, of nearly a black colour, and much less in quantity than usual." (Edin. Med. Journal, viii. 435.) This patient was again twice bled, the blood presenting the same appearances; he ultimately recovered. In a case related by Dr. Johnston, of decidedly febrile character, and which rapidly proved fatal, the blood did not separate into serum and crassamentum; it had little consistence or tenacity, but traces of coagulable lymph were diffused through it. (Edin. Med. Journal, xviii. 402.) In Dr. Duncan's case, which has been already quoted, the blood, while flowing slowly from the vein, was

* Edin. Med. Journ. v. 8. In a case related by Bateman, (Reports on Diseases of London, p. 131,) of purpura occurring in a stout farmer, with a sharp and frequent pulse, the blood also exhibited a firm buffy coat.

observed to be florid and semi-transparent, resembling diluted arterial blood. It slowly formed a loose coagulum, from which no serum was separated; the coagulum was like jelly, tremulous, transparent, and colourless, the few red globules having subsided to the bottom. In this case much blood had been previously lost by hemorrhage. (Ibid. xviii. 405.) In Dr. Combe's case the blood was pale, coagulated slowly, separated no serum, and was not buffed. (Ibid. xvii. 83.) In Dr. Gairdner's the blood first drawn by the lancet seemed, four hours after, to coagulate very imperfectly into a homogeneous mass. On the following day it resembled a tremulous jelly, the top of which was of a greenish buff colour with brownish spots like tadpoles. What afterwards oozed from the puncture resembled turbid lymph, or a watery fluid containing colouring matter in suspension; the cloths taken from the arm appeared as if stained with bloody water. (Edin. Medico-Chir. Transactions, i. 671.) In Dr. Fairbairn's case the blood first drawn resembled that described by Dr. Duncan and Dr. Combe; on a second bleeding it presented the same appearances; but on the third it showed the buffy coat, coagulated somewhat more firmly, and separated a portion of serum. (Ibid. ii. 671.)

[These facts do not accord with the recent views of Andral, (*Hématologie Pathologique*, Paris, 1843, or translation by Drs. J. F. Meigs and A. Stillé, Philad. 1844,) that the fibrinous element of the blood is probably depressed beneath its normal proportion in every case of purpura hæmorrhagica.]

The state of the urine has been less attentively noticed, or at least less frequently. We possess, however, the accounts of two cases in which the urine has been analyzed. At the conclusion of Dr. Combe's case, which we have just referred to, the results of the analysis of the urine are stated, at the height, during the decline, and after the cessation of the disease. At the height of the disease, and previous to venesection, the urine was found to contain a large proportion of serosity and of the phosphates, no free acid, and but a small proportion of urea. When the force of the disease had been broken, and the hemorrhage had ceased, there was no longer any albuminous matter, but a free acid, and but a small proportion of urea. Finally, when the patient was convalescent, the analysis of the urine detected no ingredients differing from its healthy condition. In Dr. Gairdner's case, also above referred to, the urine, on analysis by Mr. Murray, showed a deficiency of urea and an excess of albuminous matter. For the chemical details we must refer to the original cases. In Dr. Blackall's work on Dropsy, several cases are related "resembling land-scurvy," two of which, at least, are clearly cases of the hemorrhagic purpura, in which the attack was sudden and attended with febrile symptoms. In both these cases the urine was albuminous, and Dr. B. states his opinion that "venesection would have been their appropriate remedy; in the early stage, probably a successful one."

6. The appearances which are exhibited by the skin on examination after death have already been noticed. Of the morbid alterations discovered in the internal organs we possess a tolerable number of histories, recorded with various degrees of minuteness.*

The chief morbid appearances which have been noticed in the three great cavities have been the following:

In the *head*. In a case transcribed by Rayer (Obs. 174,) from Stoll, the meninges of the brain, especially on the left side, were spotted with several large ecchymotic maculæ; some ecchymoses, resembling clots of extravasated blood, from the size of a lentil to that of a bean, were also found in the convolutions of the brain. The surface of the ventricles, and that of the cerebellum, were covered with innumerable small petechiæ; the left ventricle was distended with straw-coloured serum. The girl who was the subject of this case had died comatose, having previously suffered severely from headach (which chiefly affected the left side); she had high fever, petechiæ, and hemorrhage from the mouth. In Dr. Walsh's case (Edin. Med. Journ. vol. ix.) of a soldier previously in good health, who died apoplectic on the fourth day from the supervention of purpura hæmorrhagica, besides the impression of petechial spots on the pericranium, and an ecchymosis of the right temporal muscle, a considerable coagulum (a table-spoonful) was found pressing on the brain, and the vessels of the pia mater were turgid with black blood. In Mr. Wood's case (Edin. Medico-Chir. Trans. vol. i.,) the pericranium and dura mater were covered with petechial spots, and "in the right temporal region a fine coagulum, floating in bloody serum, had forced its way through the broken-down brain into the ventricle." Similar effusions of blood on the brain were observed in two cases by Dr. Watson. (Med. Gazette, x. 502.)

In the *chest* the following appearances are noticed by Rayer as characteristic of this disease. "The outer surface of the lungs is commonly speckled with numerous ecchymoses, which are the more distinctly visible, that the surface of the lung in the intervals retains its natural hue. Beneath each of these ecchymotic spots the tissue of the lung is of a uniform brownish-red colour, is firmer in its texture than the surrounding healthy lung, and presents a circumscribed engorgement, from which, on pressure, black blood is squeezed out—a morbid alteration quite analogous to the hemoptysical engorgements described by Laennec." Similar petechial spots are also found on the surface of the heart, on the pleura, &c. The other morbid changes noticed in the thorax are not so characteristic, being common to other diseases. Such are the effusions of serous or sero-sanguineous fluid very commonly found in the cavities of the pleuræ or pericardium, or in the cellular tissue of the lungs. In one case (Dr. Johnston's) the heart is stated to have been small, pale, and easily lacerable. In some cases it has contained fluid blood, or pink-coloured gelatinous coagula in some of its cavities. The pericardium, in one case, and the inner membrane of the aorta

* *Raymann*, Acta Nat. Cur. apud Adair, diss. inaug. p. 14. Edinburgh Med. Journal, vi. 374. Ibid. ix. 164 Ibid. xiii. 402. Ibid. xiii. 405. Ibid. xxvii. 71. Edinburgh Medico-Chir. Trans. i. 681. Ibid. ii. 161. *Rayer* Malad. de la Peau, tome ii. observ. 171, 172, 173, 174 175. Cases 173 and 174 are transcribed from Stoll, Ra Medendi.

in another, showed a blush of redness. In a boy who died ten days after the supervention of purpura, Dr. Bateman found a large firm tumour occupying the situation of the thymus gland; this tumour, which must have been of slow growth, had not perceptibly affected the respiration or impaired the general health. Tubercles of the lungs were found in a case mentioned by Rayer, (Observ. 171); and pulmonary tubercles, and the marks of chronic inflammation of the substance of the lungs, were met with in another case in a child seven years old. But this case, in which petechial spots and epistaxis supervened only on the day of the child's death, and as a symptom of impending dissolution, ought not to be taken as a fair instance of purpura.

In the *abdomen*, petechial and ecchymotic spots are often found throughout a considerable tract of the mucous membrane of the alimentary canal, especially in the stomach, duodenum, and upper part of the small intestines, but sometimes also in the colon. Similar spots are also met with underneath the serous membranes, as betwixt the folds of the mesentery, and under the peritoneal covering of the viscera. Dr. Fairbairn found the cardiac extremity of the stomach emphysematous, (which did not arise from putrefaction,) the liver and spleen somewhat softened, and a bloody fluid could be squeezed from their substance; one kidney was also softened. A case is related by Dr. Bateman, where the spleen had been felt during life nearly as low as the spine of the ileum, and after death was found enormously enlarged. (Synops. p. 112.)

[Under another head (Spleen, Diseases of the) reference is made to "splenic cachexia," as it is termed in India, which is accompanied by all the signs of purpura, and which is evidently connected with, and perhaps dependent upon, hypertrophy and atrophy of that viscus. Not long ago the writer had a fatal case of this form of diseased spleen under his care, in which the organ was greatly enlarged, and encephaloid in certain portions. All the signs of purpura hæmorrhagica supervened, with hydropic infiltration of the lower extremities, under which the patient died. In another case of purpura, that fell under his care, the spleen was sound, but the liver was scirrhous, and incurable jaundice preceded the fatal termination.]

Predisposing and exciting causes.—Purpura generally may be stated to be rather a rare disease; it is especially so in its more severe forms. The purpura simplex most commonly affects children; cases resembling purpura urticans, but often presenting anomalous symptoms, occur chiefly in young women. Of seventeen cases of purpura hæmorrhagica, which were all that Dr. Willan had met with, two only were men, nine women, three boys, and three infants under a year old; four of the women were above the age of fifty. The proportion of male adults is considerably greater in the cases which have been recorded subsequently to the publication of Willan's work, especially in the severe and fatal cases.

Willan, Bateman, and Rayer agree in stating that purpura chiefly occurs in individuals of delicate habit, or enfeebled by their occupations or mode of life; by confined, low, or damp habitations, scanty food, hard labour, grief, anxiety, fatigue, and watching; or who have suffered from acute or chronic disease. In a case mentioned by Willan, it ensued on excessive drinking of undiluted spirits. (Reports on Diseases of London, p. 167.) In a fatal case which occurred to Bateman, it came on during a severe salivation, accidentally induced by a few grains of mercury. (Synopsis, p. 110.) A remarkable case is related in the appendix to Adair's Thesis, of a Hampshire farmer, aged 34, who was hereditarily predisposed to insanity, and becoming affected with religious melancholia, refused all food and drink except bread and water. After having some time subsisted on this diet, symptoms of purpura or scorbutus supervened; viz. petechiæ all over the body, accompanied by remarkable roughness of skin, a large ecchymosis above the right ham, gums tender, swollen, and bleeding, legs œdematous, pale dejected countenance, great debility, stiffness of the joints, (which preceded the petechial eruption,) oppressed respiration, bowels costive. This patient recovered under the use of vegetables and ripe fruits, for he could not be persuaded to take animal food.

On the other hand, purpura frequently occurs where no causes of a debilitating or depressing nature can be supposed to have existed; in persons in the prime of life, in the easy and opulent classes of society, breathing a pure air, and enjoying the necessaries and comforts of existence. "This circumstance," observes Bateman, "tends greatly to obscure the pathology of the disease; for it not only renders the operation of the alleged causes extremely questionable, but it seems to establish an essential difference in the origin and nature of this disorder from that of *scurvy*, to which the majority of writers have contented themselves with referring it. In scurvy, the tenderness of the superficial vessels appears to rise from deficiency of nutriment, and the disease is removed by having recourse to wholesome and nutritious food, especially to fresh vegetables and to acids; while in many cases of purpura the same diet and medicine have been taken abundantly without the smallest alleviation of the complaint. In other cases, where a residence in the country, and the circumstances of the patients necessarily placed them above all privation in these respects, the disease appeared in its severest degree." (Synopsis, p. 110.)

Pathology of Purpura.—If the opinion just adverted to of the identity of purpura with true scurvy were admitted, it would not be necessary to enter into any particular inquiry respecting the pathology of the former disease, as distinct from scorbutus. Dr. Willan seems to have entirely acquiesced in that opinion. "I consider it (purpura), under all the forms described, as pertaining to the scurvy; though it is not always attended with sponginess of the gums and a discharge of blood from them, according to the definition of scorbutus in nosology." (*Willan*, p. 466.) Into the nature and causes of scorbutus we are not to enter in this place; not only because we can say nothing satisfactory of a disease which we have never seen, and which is now happily rarely to be met with ever by naval

practitioners, but because it will form the subject of a separate article in this work. We are, however, inclined to acquiesce in the opinion of Bateman and of most succeeding writers, that purpura (at least many cases of it) is distinct in its nature, causes, and mode of treatment, from the true scurvy described by Lind, Trotter, &c. and as we conceive there can be no doubt of the truth of Cullen's doctrine, "that there is one disease only entitled to the name of scurvy; that it is the same by land as upon the sea, depending every where upon the same causes," (First Lines, sec. 1790,) it appears to us that the name of *landscurvy*, as a synonym for purpura, (Good's Study of Med. vol. ii. p. 875, and Syst. of Nosology, p. 268,) is improper, and calculated to lead to an erroneous notion of the latter disease.

The late Dr. Duncan enumerates the following as the possible modes in which he conceives the phenomena of purpura might be produced:—1. increased tenuity of blood, allowing it to escape from the extremities of the capillary arteries; 2. dilatation of the mouths of these arteries, allowing natural blood to escape; 3. tenderness of the coats of the minute vessels, giving way from the ordinary impetus of the blood; 4. increased impetus of the blood, rupturing healthy vessels; 5. obstruction in the vessels causing rupture; 6. two or more of these causes acting simultaneously or successively. But he acknowledges that he cannot reconcile any of these suppositions with the phenomena of the disease. (Edin. Med. Journ. ix. 410.) Other recent writers equally confess their ignorance of its true pathology. Of the intimate nature of the process by which the blood is poured out at once from the capillaries of the cutaneous surface, and of the internal organs, we must probably be content to remain ignorant, until the *physiological* action of that important part of the vascular system shall be better understood than it is at present. Many processes, both natural and morbid, are not more explicable than the occurrence of petechiæ, either as a symptom of fever, or from other causes; and especially the process of *hemorrhage by exhalation*, of the close connection of which with the phenomena of purpura there can be no doubt.

The most striking peculiarity of purpura, considered as a hemorrhagic disease, is the *universality* of the hemorrhagic tendency, whereby the blood is poured out not only from the various mucous membranes, at least from several of these outlets, simultaneously or in succession, but is also effused into the textures of the skin and cellular membrane, forming petechial spots, and occasionally into the serous cavities or the texture of the solid viscera. It is, therefore, a very probable, if not a certain conclusion, that the immediate cause of these phenomena is one affecting the whole system; and none seems so probable, or so well accords with the phenomena, as *an alteration in the composition and vital properties of the blood.* When we take into consideration the analogy which subsists between the phenomena of purpura and those of petechial fever on the one hand, and of cachexy, passive hemorrhage, and scorbutus on the other, it is highly probable that a similar cause is in operation in all these cases. In scorbutus it is generally admitted that the composition of the blood is vitiated. That a change both in its composition and its vital properties is intimately concerned in the production of the phenomena of fever, is a conclusion the proofs of which are rapidly accumulating upon us. (See the articles Fever, and Morbid States of the Blood, in the present work.) We have, therefore, strong analogical grounds for believing that a like cause is productive, at least in some cases, of that assemblage of symptoms to which we give the name of purpura. The proofs of this opinion will be found fully and very ably developed in Dr. Watson's Lecture on Purpura, (Medical Gazette, vol. x. p. 498,) to which we refer the reader.

The third hypothesis suggested by Dr. Duncan, viz. weakness or frangibility of the coats of the capillary vessels, has several facts to support its probability, and especially the tender state of the gums, and the readiness with which blotches and ecchymoses are produced in some cases by the slightest pressure on the skin. Such a state may coexist with a primary diseased condition of the blood, and may be induced by the circulation of such blood through these vessels, which is not improbable; though, as Dr. Watson has suggested, the relation of cause and effect may be different from this: "It is easy to imagine that some derangement (of the nature of which, supposing it to exist at all, we know nothing) in that part of the circulating system which is strictly capillary, and in which those changes take place whereby the blood, from being scarlet or arterial, becomes purple or venous, should modify or interfere with the change itself, and so come to affect the quality of the blood." (Medical Gazette, vol. x. p. 499.)

But to whatever conclusion the pathologist may come on these points, it cannot affect the practical fact, that purpura is not unfrequently connected with a state of the system at large, or of particular organs, which not only will bear, but requires depletory measures for its removal, and which renders the use of tonic and stimulant remedies improper and dangerous. Of this the recorded cases of the disease supply abundant evidence. "The rapidity of the attack," observes Dr. Bateman, "the acuteness of the pains in the internal cavities, the actual inflammatory symptoms that sometimes supervene, the occasional removal of the disease by spontaneous hemorrhage, the frequent relief derived from artificial discharges of blood and from purging,—all tend to excite a suspicion that some local congestion or obstruction is the cause of the symptoms in different instances." (Synops. p. 111.)

Diagnosis.—The diseases with which purpura is most likely to be confounded are, typhous fever attended with petechiæ, and scorbutus. Where the symptoms denoting purpura are accompanied by febrile symptoms of some intensity, it may become a question whether the purpura or the fever be the primary disease. The origin and course of the complaint, the period at which the petechiæ appear, the extent and the variety of the accompanying hemorrhages, will enable the practitioner to judge of the nature of the case. With regard to scorbutus, that disease is now fortunately seldom if ever to be met with in its genuine form. Cases of petechial efflorescence attended with he-

morrhage and signs of great general debility, without any febrile or inflammatory symptoms, may be considered by some practitioners as properly belonging to scurvy; and if they occur in patients who have been much exposed to the influence of debilitating causes, the tonic treatment appropriate to that disease, and especially pure air and an improved diet, will generally be beneficial.

Prognosis. — In the milder cases of purpura, which are unattended by hemorrhage, by any considerable febrile symptoms or organic disease; or where the hemorrhage is slight, or attended with amelioration of the symptoms; a favourable prognosis may be formed. But when much blood is lost by the profuse occurrence or long continuance of hemorrhage, or where there are symptoms of serious internal congestion or inflammation, high fever, or great depression of the vital powers, the prognostic is unfavourable. Even in chronic and *constitutional* cases a guarded prognosis should be given, and the danger of the supervention of fatal hemorrhage should not be lost sight of.

Treatment.—While the older doctrines prevailed, which ascribed the symptoms of purpura solely to debility of the solids and attenuation of the blood, a tonic and invigorating treatment was universally recommended. The mineral acids, cinchona, and wine, comprehended the whole medicinal treatment; these, however, were acknowledged to be often merely palliative, and to have little effect in producing a radical cure. (*Adair*, Diss. Inaug. p. 18.) The same remedies are alone mentioned by Willan, who at the same time insists strongly on the importance of pure air, exercise, good diet, and whatever may tend to produce cheerfulness and serenity of mind. (*Willan*, Reports, p. 93; Cutan. Dis. p. 461.) Willan's experience of this disease had not been extensive; and in particular its more severe and fatal forms had not occurred to him. The publication of his opinions respecting this disease and its treatment called forth the observations of Dr. Parry on the utility, in some cases, of venesection. (Edinb. Med. Journ. v. 7.) Dr. Harty and Dr. Bateman subsequently called the attention of the profession to the benefit to be derived from the employment of purgative medicines. Dr. Harty having experienced a complete failure in a case of purpura hemorrhagica which he treated strictly according to the plan of Willan, with every advantage of country air, nourishing diet, and tonics, had his attention turned to the functions of the alimentary canal in this disease. In a seemingly very unfavourable case of purpura hemorrhagica, in a tedious and obstinate case of purpura simplex attended with fever and headach, and in nine others, he employed brisk purgation with decided success. (Edin. Med. Journ. v. ix. p. 186.)

Dr. Bateman, after admitting that in slighter degrees of purpura, occurring in women and children who have been under the influence of close air, want of exercise, and other debilitating causes, the tonic plan, as recommended by Willan, may be adequate to the cure of the disease, adds :— "But in adults, especially those already enjoying the benefits of exercise in the air of the country, and who have suffered no privation in respect to diet; or when it appears in persons previously stout, or even plethoric; when it is accompanied with a white loaded tongue, a quick and somewhat sharp, though small, pulse, occasional chills and heats, and other symptoms of feverishness, however moderate; and if at the same time there are fixed internal pains, a dry cough, and an irregular state of the bowels, — symptoms which may be presumed to indicate the existence of some local congestion,—then the administration of tonic medicines, particularly of cinchona, wine, and other warmer tonics, will be found inefficacious, if not decidedly injurious. In such cases, free and repeated evacuation of the bowels, by medicines containing some portion of calomel, will be found most beneficial. The continuance or repetition of these evacuants must, of course, be regulated by their effects on the symptoms of the complaint, or on the general constitution, and by the appearance of the excretion from the intestines. If the pains are severe and fixed, and if the marks of febrile irritation are considerable, and the spontaneous hemorrhage not profuse, local or general bloodletting may, doubtless, be employed with great benefit, especially in robust adults." (*Bateman*, Synops. p. 114.) We have given Dr. Bateman's practical directions at length, because little has been added to them by subsequent writers, except in the way of illustration. We apprehend that in very few cases will tonics be requisite or admissible, at least at the commencement of the disease. We have seen them do evident mischief, even in children of delicate frame, in whom the cautious but effectual employment of laxatives and a mild antiphlogistic regimen have afterwards effected a cure. From the manifest success of purgatives, and especially calomel, in the congestive form of typhous fever attended with petechiæ, practitioners have learned not to be deterred by the symptoms of apparent debility from employing this most useful class of remedies in such fevers; and in purpura, notwithstanding similar signs of prostration of strength, they are no less efficacious.

Venesection is a more hazardous remedy, and requires greater discrimination as to the cases and period of the disease in which it probaly may be employed with safety and advantage. In the circumstances pointed out by Bateman, and especially where there is hardness of pulse and fixed local pain, there can be no doubt of the propriety of having recourse to it, especially at an early period of the disease. But we must be very cautious not to push it too far, or employ it too late to be of benefit. Dr. Mackintosh informs us that he lost a patient some hours after she had been bled; and the subject of Dr. Fairbairn's case, though a strong man in the prime of life, never rallied after the third bleeding. Dr. Fairbairn candidly confesses that he doubts whether the bleeding was not carried too far. In other cases which have been treated by venesection, but where, from the symptoms of debility or supposed putrescent tendency, wine and other stimulants have been administered, it is much to be suspected that these have proved injurious, and that if a mild antiphlogistic regimen had been trusted to, the result might have been more satisfactory.

In conclusion, we may sum up by observing that, in the treatment of cases of purpura, we are not to be guided by the name or the external appearances of the disease, but by diligent attention

to the symptoms, and especially to the state of the functions, and the habit and constitution of the patient. Where high excitement prevails, with strength of pulse and vigour of constitution, and we have reason to suspect inflammation, or an approach to it, venesection and free purging, with a suitable antiphlogistic diet, are the appropriate remedies. Where a quite opposite state exists, extreme languor and debility, pale cachectic complexion, small and weak pulse, and much hemorrhage has occurred, all active depletion must be abstained from, and the strength supported by beef-tea and other mild nutriment, while sulphuric acid, and perhaps divided doses of quinine, may be resorted to. In intermediate cases, a mixed treatment must be adapted to the exigencies of the particular case by the discrimination of the practitioner. It will be often much safer in such cases, where any doubt exists as to the proper plan of treatment, to adopt one almost purely negative, as saline diaphoretics and a mild antiphlogistic diet, (paying due attention to the bowels,) than to have recourse to any extreme measures.

Local hemorrhage, when trifling in its amount and occurring early in the disease, it may not in all cases be advisable to interfere with. It has in several well-attested cases appeared to be a salutary effort of nature, and has removed the symptoms of the disease. Where the hemorrhage is protracted, or dangerously profuse, the usual means (pointed out in the article Hemorrhage, and in those which treat of the individual hemorrhages) must be had recourse to to arrest it; and of these there is none so generally efficacious as the application of cold.

Some particular modes of treatment have been recommended in this disease, of which we cannot speak from experience, and therefore we shall merely refer to them. The oil of turpentine was employed with success by Dr. Nicholl in several cases of purpura unattended with fever, and which he conceived to depend on mere relaxation of the extreme vessels. A successful case of its employment has since been published by Dr. Magee; but it should be noticed that both these physicians employed it in combination with laxatives. Dr. Mason Good and Dr. Mackintosh recommend the vegetable acids in purpura, in preference to the mineral; the latter especially speaks in favour of "fresh lime-juice, not only taken internally, but applied externally." Spirit-lotions, or a solution of chloride of lime, or cloths dipped in vinegar and water, are advised by Rayer to be applied to those parts of the skin which are spotted with petechiæ and ecchymoses; we confess we do not understand on what principle.

Dr. Belcombe, physician to the York County Hospital, has recently applied with success to this disease the principles of treatment which Dr. Stevens has advocated in certain diseases conceived by him to depend on a morbid deterioration of the blood, and especially in the fevers of hot climates and in epidemic cholera, namely, the administration of neutral saline remedies, not intended to act as cathartics. In a decided and severe case of purpura hemorrhagica, in which Dr. Belcombe adopted this treatment, according to the formula of Dr. Stevens, (bicarbonate of soda ℥ss, muriate of soda ℈i, chlorate of potass gr. vii.;) the result was the recovery of the patient; and in two other cases of petechial eruption which have since occurred to him, he has had recourse to it with the same success.

George Goldie.

PUS, (from *πύον, matter,*) a yellowish-white, bland, cream-like fluid, having a sweetish taste and faint smell, heavier than water, (Sp. gr. about 1.03,) found in abscesses, on the surface of ulcers, and occasionally deposited on free surfaces, or in the tissue of organs.

An account of the various opinions entertained of its formation, as well as a description of its physical and chemical properties, will be found under Abscess, Inflammation, and Suppuration.

A. Tweedie.

PYLORUS, DISEASES OF THE.—See Stomach.

PYROSIS, (Gr. *πύρωσις, burning, inflammation;* from *πυρόω, to burn;* th. *πῦρ, fire.*)—This is the generic name of a disease adopted into their nosological classifications by Sauvages, Sagar, and Cullen, and, according to the definition of the last mentioned writer, synonymous with the cardialgia *sputatoria* of Linnæus and Mason Good. Sauvages has defined it, "Sensus ardoris in ventriculo et œsophago sine febre acutâ;" and Sagar, "Ardor œsophagi ad ventriculum usque extensus sine febre, vulgo soda dicitur;" both corresponding to the character of soda in the system of Vogel, formerly a common but now obsolete name for *heartburn.* But the peculiar combination of symptoms which the early writers on medicine had included in their general descriptions of gastric disorder, particularly under the term cardialgia, and which previous nosologists had classed as one of several species of the same genus under the generic name of pyrosis, Cullen was the first to consider as the indications of a distinct idiopathic disease, which he separated accordingly, and placed in his class Neuroses, and order Spasmi, with the following definition, "epigastrii dolor urens cum copia humoris aquci, plerumque insipidi, aliquando aeris, eructata." Such has been the general and limited acceptation of the word pyrosis in this country since the time of Cullen, and the signification we attach to it in the present article.

This form of disease is known in England by the popular name of *black-water,* and in Scotland by that of *water-brash.* It is most frequently to be observed amongst the poor, but sometimes, though rarely, in persons of more fortunate condition in life. In Scotland, Lapland, and Iceland, it has been observed to be endemic, and probably is a prevailing disease in many other countries; in England it is strictly sporadic. The subjects of it are most commonly persons under middle age; it seldom appears before puberty, and very rarely in advanced life. Females are more often affected with it than males, sometimes during pregnancy, and occasionally it seems incidental to this state, subsiding when it terminates, and recurring with its repetition. It most frequently, however, occurs in the unmarried, and of the married, most frequently in those who have never been pregnant: in many instances it appears when leucorrhœa has been present. Having once taken place, it is apt to return for a long time after; and though often

extremely difficult to cure, is seldom if ever directly attended with danger to life.

The **Causes** by which it has been induced have never been satisfactorily determined; but the facts of its endemic occurrence, its almost exclusive prevalence among the lower classes of the community, even where it is only sporadic, as in this country, and regard to the functions of the particular organ which appears to be chiefly implicated, have raised a prevailing belief that the ingesta have a powerful influence on its production. It was remarked, however, by Cullen, that he had not observed its connection with any particular diet, and that persons using animal food were subjects of it, although he thought more frequently those whose subsistence was milk and farinaceous substances. In Scotland, however, (the field, be it remembered, of Cullen's observations,) unfermented meal forms the bulk of the diet of the poor; and up to the present time the same substance in the form of oat or barley cake has stood as an article in the diet of the great mass of the people, in the same relation as wheat bread to the diet of the people of this country. The similar use of other articles of food defective in its nutritious quality, and difficult of digestion, has been commonly observed to precede its occurrence, and in those whose idiosyncrasy predisposes them to be so affected, (a condition of which we acknowledge our entire ignorance,) all those circumstances which obstruct the natural functions of the stomach are, more or less, conducive to the development of pyrosis.

In some instances the use of indigestible substances has appeared to us to have been an *exciting* cause of the attack; but those which are most generally considered so, are suddenly diminished temperature, particularly in the application of cold to the feet, and extraordinary emotions of the mind.

The paroxysms of pyrosis, according to Cullen, (whose description of the symptoms has been considered most faithful,) usually come on in the morning and forenoon after food has been abstained from for some hours, though in our experience the period has not uncommonly been two or three hours after dinner: its first symptom is a pain at the epigastrium, described as that of extreme heat (emphatically called by the French *fer chaud*,) with a sense of constriction, as if the stomach were drawn towards the back, the pain being greatest when the body is in the erect posture, and causing it to be bent forwards; it is often very severe, and after continuing for some time is followed by an eructation of thin fluid, varying in quantity, but in appearance always resembling water; to the taste it is often absolutely insipid, but sometimes extremely sour. Though apparently the occasion of a sense of extreme heat in the stomach and œsophagus, the ejected fluid in passing through the mouth occasionally impresses it with an opposite sensation of cold in a very remarkable degree. The eructation is frequently repeated, and the pain which preceded it does not immediately cease, but does so after a time, and terminates the paroxysm. These paroxysms vary in their duration, both in the same and in different individuals, recurring often successively every day for a considerable time, and sometimes intermitting for one or several days, but always with great irregularity. Cullen has declared that pyrosis is often unattended by any symptoms of dyspepsia, but the remark is not only inconsistent with his own definitions of the two diseases and his observations upon them, but (we presume to say) with general experience. That the symptoms vary in number and degree we doubt not, but their entire absence we conceive to be extremely rare: one which has appeared to us to have been almost invariably present has been pain at the epigastrium immediately consequent to swallowing any ordinary food. We are, moreover, without proof or reason of probability that the morbid condition of the stomach which gives rise to pyrosis differs in any essential degree from that which occasions some other forms of dyspepsia, certain variations in the phenomena of which are as much beyond our explanation, as the specific distinctions by which they are severally characterized. The distinguished writer we have so frequently had occasion to cite, seems indeed to have been unconscious of the approximation of his own ideas on this point in reference both to dyspepsia and pyrosis, having defined the proximate cause of dyspepsia, "an imbecility, loss of tone, and weaker action in the muscular fibres of the stomach," and spasm (which can be viewed in no other light than a consequent condition, and of the same structure), as the proximate cause of pyrosis. "It seems," says he, "to begin by a spasm of the muscular fibres of the stomach, which is afterwards in a certain manner communicated to the blood-vessels and exhalants, so as to increase the impetus of the fluids in these vessels while a constriction takes place on their extremities. While, therefore, the increased impetus determines a greater quantity than usual of fluid into these vessels, the constriction upon the extremities allows only the pure watery parts to be poured out, analogous in every respect to what happens in diabetes hystericus." Another and opposite view has been suggested by Mason Good, who considers that in some instances pyrosis may be induced by a peculiar paresis or inactivity of the proper absorbents of the stomach,—an hypothesis founded on some experiments of Magendie, proving the rapidity of the absorption of fluids from the stomach in a state of health, even when its pyloric orifice has been encircled by a ligature; but the absorption of other fluids, and the regurgitation only of the morbid product, reflect a degree of improbability on this conjecture. We are, indeed, without any evidence that the latter is actually secreted by the stomach, and it has been surmised, from the resemblance between the natural secretion of the pancreas and the ejected fluid, that it may be derived from this source: the writer, however, is not aware that the latter has been submitted to chemical analysis, but the result of this process promises means of comparison whereby the supposition would be further confirmed or invalidated. *A priori* it appears impossible that a fluid so uncongenial to the sensibility of the stomach should be admitted into it by an inversion of the natural action of the duodenum without more violent efforts than are manifested, or that the fluid itself proceeding from this source should appear entirely free from any admixture of bile

[The writer is disposed to regard it as a form of gastrorrhœa. In some persons, the secretion is so copious, that they can eject at pleasure considerable quantities of fluid, especially in the morning before taking food,—or they possess what has been termed the faculty of *vomiting at pleasure*. (See the article INDIGESTION, vol. ii. p. 639.)]

Prognosis.—Pyrosis in its simple form is never attended with danger to life, nor does it commonly even prevent the sufferer from pursuing his ordinary occupation. The physician, however, is frequently baffled in his attempts to cure it, and even when there has been a reasonable hope of the remedial means having been successful, a recurrence of the watery eructation has not unfrequently exposed its fallacy.

Treatment.—The doubt in which our knowledge of the pathognomonic causes of pyrosis is involved, obscures the indications on which the method of treating it should be grounded and pursued with a rational anticipation of success; nor has observation even up to the present period in any satisfactory degree supplied the deficiency. Opium will certainly relieve the paroxysm; and its various preparations, as well as other anodynes and antispasmodics, as hyoscyamus and conium, with camphor, the compound spirit of sulphuric ether, and the aromatic spirit of ammonia, variously selected and combined according to the peculiarities of the circumstances of the patient, will all be found useful for this purpose, but relief of the paroxysm appears only to be a temporary advantage: to render it permanent, the intermediate state must be the object of our more particular consideration. We have the warrant both of reason and experience for concluding that digestion cannot be perfectly accomplished whilst the functions of an organ so important to it as the stomach are subject, whether primarily or secondarily, to the frequent interruptions occasioned by the accessions of this disease. A morbid state of the pancreas we know also will materially obstruct this process. The regulation, therefore, of the diet is a most essential point in the plan of treatment; all substances which are likely to ferment are difficultly digestible, and manifestly productive even of temporary discomfort or uneasiness, and the farinacea should as far as possible be avoided. It might be even advantageous, and especially when the disease is endemic, to effect an entire change in the articles which have constituted the general diet, so regulating the quality and limiting the quantity as if the cure of indigestion, whether evident or not, were the object to be effected. Any deviation from the natural state in the functions of the liver or alvine canal should be corrected by remedies appropriate to their particular condition; but in the special plan of the treatment of pyrosis, it will be found advantageous occasionally to produce a laxative effect on the latter, and for this purpose aperients which occasion a sense of warmth in the stomach have been found most suitable; such, for instance, as the compound decoction of aloes, combinations of the powder of rhubarb with magnesia, the compound tinctures of rhubarb and cardamoms, and peppermint-water, the powder and compound tincture of rhubarb, with carbonate of ammonia and camphor mixture, &c. It has further been the practice pursued to attempt to restore the supposed loss of tone in the muscular fibres of the stomach, and at the same time to neutralize the acid secretions which are commonly present. The particular medicines used with this view have been various combinations of the vegetable tonics with aromatics, and large doses of alkalies and the alkaline earths; of the former, particularly the carbonate of ammonia and its preparations. Tonics of the same kind with the mineral acids, particularly sulphuric, have also been recommended for this purpose. The various preparations of iron and zinc have also been had recourse to, but we believe it to be the result of general experience, as it has been of our own, that however such means may have counteracted any other coexistent symptoms resulting from dyspepsia, or have mitigated or suspended the painful accessions which constitute this affection, its recurrence has too often taken place as usual.

Cullen distinctly states that all the remedies for the cure of indigestion have been applied to it without success, and the late Dr. Baillie has left it on record that, consistently with his experience, it had been little benefited by medicine. He added, however, that a drachm of compound tincture of benzoin rendered miscible with water by trituration with mucilage, he had found the most efficacious of any. (Lectures and Observations on Medicine, by the late Matthew Baillie, M. D., 1825.) We know it to have been also a favourite prescription of another experienced eminent physician in the treatment of pyrosis. Astringents, such as the compound powder of kino given three times a day in doses of ten grains, have been considered serviceable in cases of dyspepsia in which pyrosis has been a prominent symptom. Linnæus, who had frequent opportunities of witnessing the disease, recommended the nux vomica for its relief, in doses of ten grains three times a day; but this has been regarded, and doubtless is, a very hazardous quantity to commence with. We are not aware that strychnine has been substituted for it; but the preceding recommendation points it out as worthy of trial, in doses of from a twelfth to a sixth of a grain every eight hours. The subnitrate of bismuth, suggested as a remedy in cases of gastrodynia and other painful affections of the stomach by Dr. Odier of Geneva, and favourably reported of by Dr. Marcet in the fifth volume of the Memoirs of the London Medical Society, in similar cases, was particularly recommended as a useful medicine in the cure of pyrosis by Dr. Bardsley of Manchester, in his "Medical Reports of Hospital Practice," published in the year 1807. His recommendation is accompanied with a detail of several cases in which its use was successful; and with the comment, that in pyrosis and disorders of the same kind it exerts a local and specific action upon the organs of digestion, restoring the stomach to a state of vigour and consequent healthy secretion, essential to the removal of the symptoms of acidity, spasm, and pain. Dr. Bardsley prescribed it in doses of five grains with from fifteen to twenty grains of compound powder of tragacanth, two or three times in the day; a mode which we have found useful in similar cases. Dr. A. T. Thomson speaks highly of it in combination with extract of hops, having found it, as he states, extremely beneficial

in pyrosis, gastrodynia, and some other varieties of dyspepsia; and when there has been merely atony of the digestive organs without organic mischief, almost universally successful. Mason Good has spoken in high commendation of the internal use of soap in pyrosis, combined with opium if it should be attended with much pain; he refers the efficacy of the former to its decomposition allowing the alkali to unite with the acrid secretion, whilst the oil defends the stomach from the action of any acrimonious matter which may be present. He has not, however, mentioned the quantity or form in which he has prescribed it; but from the benefit we have known it to produce with rhubarb and extract of gentian in some of the modifications of dyspepsia, we should be inclined to adopt a similar combination in prescribing it for the cure of pyrosis. On the principle of allaying irritation, and thereby favouring a slower, and consequently more healthy gastric secretion, hydrocyanic acid has been recommended for the relief of pyrosis; but experience is yet required to determine whether it possesses any lasting power over it. The decided advantage derived from its use in cases apparently allied to pyrosis, leads us to anticipate that it will be found a valuable medicine in the treatment of the latter affection. Commencing with a dose of two minims, we may gradually increase it to five; and it will be suitably prescribed diluted with an ounce and a half of water and a drachm of tincture of calomba every eight hours.

In conclusion, we refer the reader to the article Indigestion, in which the various disorders of the stomach commonly classed under the term dyspepsia have been fully discussed, and particularly to the third section of that article, which describes pyrosis in relation to them, under the head of *irritable gastric dyspepsia*.

William Kerr.

RAPE.—The high value set upon female purity, and the heavy penalty incurred by its loss, in the banishment of the delinquent from society, have led most civilized countries to inflict the severest punishments on the individual guilty of a forcible violation of the weaker sex. When we consider, on the one hand, the condition of a virtuous female thus plunged into an abyss of misery, a release from which by death has been voluntarily sought by many; and, on the other, contemplate the number of profligate persons who are found in all countries and societies, whose chief occupation seems to be the corruption and debasement of the female sex; we cannot fail to rejoice that the strong arm of the law should interpose its protecting shield, and visit with its severest judgments one of the grossest crimes that vice can perpetrate. By the law of England, rape is defined to be the carnal knowledge of a woman against her will, and death is its penalty. All classes of females are equally protected, the virgin, the married woman, and even the common prostitute is included, because she may at the very time have determined on a reformation of her former habits. In Scotland the ravisher is exempted from the pains of death, only in case of the woman's subsequent consent, or her declaration that she yielded of her own free will; and even then he is to suffer an arbitrary punishment either by imprisonment, confiscation of goods, or a pecuniary fine. (Edin. Encyclop. vol. xi. p. 823.) In the state of New York, death was formerly the punishment for committing a rape on a married woman or a maid; and it was also ordained at the same time, that if a woman had been ravished, and afterwards consented to her ravisher, her husband, father, or next of kin, might sue by appeal against such offender. These laws, however, have been repealed, the punishment altered, and appeals of felony abolished. The acts now in force prescribe the punishment of imprisonment for life in the State-prison, of the offender and his accomplices, if he have any, for ravishing by force any woman-child of the age of ten years and upwards, or any other woman. An assault, with an intent to commit a rape, may be punished by fine and imprisonment, or both.

[It has also been enacted that every person who shall have carnal knowledge of any woman above the age of ten years, without her consent, by administering to her any "substance or liquid," which shall produce such stupor or such imbecility of mind or weakness of body as to prevent effectual resistance, shall, upon conviction, be punished by imprisonment, in a State-prison, not exceeding five years.

In Massachusetts, Rhode Island, Delaware, and South Carolina, it is a capital offence. In Connecticut, Georgia, Illinois, Indiana, Ohio, Maine, New Hampshire, New Jersey, Vermont, Pennsylvania, Virginia, and Michigan, imprisonment for a term of years, or for life, is directed; in Louisiana, imprisonment and hard labour for life; and in the States of Missouri and Arkansas, the punishment is castration. (Beck's *Medical Jurisprudence*, 5th edit., i. 160, Philad. 1838.)]

In the case of adults, it is necessary, in order to constitute a rape, that the act shall have been committed against the will of the female; but in the case of children, in whom the power of judging between right and wrong is not supposed to exist, the matter of consent is of no moment, and the deed is equally criminal whether it be obtained or not. "A female infant under ten years of age is in law deemed incapable of consenting to any act, much less to her dishonour; the carnal knowledge of such infant, whether she yield or not, is therefore virtually a rape; but whether if the child be above ten years of age, it be also a felony, has been questioned. Sir Matthew Hale was of opinion that such profligate actions, either with or without consent, amount to rape and felony, as well since as before the statute of Queen Elizabeth; but in his Summary, the learned judge appears to have altered his opinion; and the present practice is, that if the child be under ten years of age then it is felony by the statute; but if she be above ten and under twelve, then it is no rape if she consented, but only a misdemeanour." (*Paris and Fonblanque*, Med. Jur. vol. i. p. 419.) The French code extends the period to fifteen years, and punishes the crime committed on a child of that age by hard labour for a limited time. (*Capuron*, p. 1.) "In New York the carnal knowledge of a woman-child under ten years of age is punished by imprisonment in the State-prison for life. In Massachusetts and Illinois, death is the punishment. In Virginia, New Hampshire, Connecticut, and New Jersey, impri

sonment either for life or a long term of years is directed. All these specify the period of ten years. The law in Vermont varies from this. It directs that whenever any individual over the age of fifteen shall abuse any female under eleven with or without her will, he will suffer fine and imprisonment." (*Beck*, p. 60.)

[It would appear that the punishment of death is awarded for this offence in only one State of the Union—Massachusetts. In Virginia, Connecticut, New Hampshire, Maine, New Jersey, Illinois, Ohio, Michigan, and Tennessee, the punishment is either imprisonment for life, or a term of years, or fine, or imprisonment, or both. All these specify the period of ten years. In Indiana, the age of the female is extended to twelve years, and the punishment is imprisonment for a term of years. In Missouri, a rape on a female under the age of ten years is punished by castration. In Delaware, the law directs a fine, standing in the pillory for one hour, sixty lashes on the back,—well laid on,—imprisonment for not more than two years, and afterwards to be sold as a servant for a term not exceeding fourteen years. (Beck, *op. cit.* i. 153.)]

By the ancient law of England, the woman was required to make her accusation immediately after the commission of the outrage. At a subsequent period she was allowed forty days as the utmost limit; but by the law as it at present stands, there is no time of limitation fixed. However, although there is no limit fixed by law, public opinion demands an early discovery; and an accuser who has postponed her complaint for any unreasonable length of time, is listened to with great caution by a jury. In fact, this is a crime so easily charged, so hard to be proved, and so much harder to be rebutted, that it is of the utmost importance that no time shall be allowed for concocting a malicious tale, particularly if medical testimony is to be adduced, as a few hours are often sufficient to efface appearances that might have been evident on an early examination. Indeed, in all cases, the greatest caution is necessary in judging of the guilt of an accused party. There is generally no witness to confirm the direct testimony of the accuser as to the fact; the whole case turns upon the woman's assertion, and unless there is strong collateral evidence, such as a speedy disclosure to her friends and the authorities, and an early medical examination, we are of opinion that it should require the clearest and most unshaken testimony on the cross-examination to gain credence with a jury. It is better that ten guilty should escape than that one innocent man should suffer: and however we abhor the crime, and would wish the heaviest punishment to overtake the guilty, we cannot help offering this caution to medical men and jurors, knowing as we do the depravity of the human heart, and the lengths to which it will sometimes go to accomplish the ends of malice or revenge. It is not impossible, nay, it has sometimes happened, that a woman who has freely consented to surrender her virtue will afterwards turn round on her paramour, and denounce him as her ravisher. This becomes a case of the greatest intricacy from the fact of the principal feature (that of the venereal congress having taken place) being true. It now passes out of the hands of the medical jurist, and becomes a question with the jury whether they believe the deposition of the woman as to consent or not. This, it must be confessed, is a most difficult question to solve, and it requires all the ingenuity of the bar to sift to the bottom all external circumstances which may contribute to prove the negative. Cases of a mixed kind are also sometimes met with; as when a woman will at first resist the advances of a suitor, and even continue her resistance for a time, but afterwards, from the excitement of passion or some other cause, yields to his desire. This is a case, if possible, more puzzling than the former, because marks of violence on the limbs of the female, from her previous struggling, may be evident, which would naturally lead to the supposition that the act had been accomplished by force. We confess that we should be inclined to deal hardly with a man under such circumstances, from the difficulty of understanding what constitutes consent. The act is committed in secret; there are no witnesses; the woman is bruised on the limbs and body; and her person is violated: it is not likely that a formal question of "Will you consent?" has been put, followed by an answer of yea or nay; and yet, after the employment of so much force, the man defends himself by saying the woman consented, which she denies. The jury alone can determine which is to be credited; but, as we already said, appearances are strongly in favour of the woman, and a struggle of such violence and duration, followed by coition, amounts, in our opinion, if not to a legal, at least to a moral rape. Having spoken thus generally of some of the difficulties attending the investigation of accusations of rape, we proceed to consider some of the points upon which medical testimony is more particularly required.

Of the physical Signs of Violation.—These are the absence of the signs of virginity, marks of violence, tumefaction, or laceration of the pudenda, with effusion of blood, and bruises on other parts of the body, particularly on the breasts, arms, and thighs. It must be evident that the most important of these, that is, the want of the attributes of the virgin state, together with the injuries inflicted on the genital organs, as evidenced by inflammation and tumefaction, cannot apply to all women, but only to virgins; for in married women, or those previously in the habit of sexual intercourse, the negative signs are of course of no value, and the positive are not likely to occur. And this narrows our present observations to the signs of rape committed on virgins.

The investigation of this subject must be preceded by an exposition of the signs of virginity. This is a question which has occupied the attention of anatomists and physiologists from an early period; but it does not appear that any very accurate conclusions have been agreed upon.

The existence of the hymen is the sign upon which the greatest stress has been laid by some authors, while, strange to say, its presence has been esteemed by others, among whom we find Ambrose Paré, Columbus, Dionis, and Buffon, as an unnatural formation. However, at the present day, it is generally considered as an attribute of the human virgin. The hymen is a membranous or membrano-carneous structure.

which is situated at the entrance of the vagina, and serves to form a boundary between that passage and the external genitals. It is formed by duplicatures of the lining membrane of the vagina, and is usually of a crescentic form, leaving an opening into the vagina at its upper part. This opening serves as an outlet for the menses, and in the average of adult subjects is large enough to admit the index finger sufficiently high up into the vagina, to effect an examination of the os uteri, without injury to the hymen. Dr. Davis states that in breech presentations he has sometimes introduced his finger into the vagina of the infant without injuring this membrane. The shape of this membrane, however, is various and uncertain. In some cases it is more or less circular, presenting through its centre a round aperture of three or four lines in diameter. At other times only a part or exclusive portion of the orificial extremity of the vagina, sometimes the superior, at other times the inferior portion of it, is seen to be veiled over with this structure. In some rare cases the hymen is an imperforate circular membrane attached to the edge of the orifice of the vagina in every part, so as to close the canal completely. We have already alluded to some of these cases in the article IMPOTENCE. Another form of the hymen is, when there are two crescental portions attached to the more carneous structure of the external orifice laterally. The structural tissue of the hymen seems in some measure to vary in different instances. "In most fœtal subjects it seems to be distinctly membranous, whilst in some others it partakes also of a carneous character. Hence, probably, the very different descriptions given of it by different authors. By Soranus it is accordingly described as being membranous; by Avicenna as veinous and ligamentous; by Riolanus as carneous; by Berengarius as retiform, consisting of vascular and delicate ligamentous tissue; by Columbus as a thick substance; and by Spigelius as partly carneous and partly nervous." (Princip. and Pract. of Obstet. Med. by Dr. Davis, p. 100.) In order to see this membrane in the living subject, it is necessary to separate the labia and even the thighs to a considerable distance from each other; for the opening into the vagina is quite closed up by the external parts in the ordinary positions of the body. The hymen is usually torn by sexual intercourse, and its rupture is attended by an effusion of blood; an appearance upon which so much reliance was placed by the Jews as a test of virginity, that the nuptial sheets were constantly exhibited to the relations on both sides, and preserved by the friends of the woman as evidences of her chastity. In case this token of virginity was not found on them, she was to be stoned to death at her father's door. After the rupture of the hymen, its remains shrivel towards their base into several small excrescences at the orifice of the vagina. These are thick, red, and obtuse at their extremities, and from their fancied resemblance to a myrtle-berry, have been called *carunculæ myrtiformes*. They generally disappear after frequent connections or deliveries. The carunculæ which are found at the opening of the vagina are not, however, always remains of the hymen. Dr. Conquest (Outlines of Midwifery, p. 17,) remarks that the carunculæ may be found when the hymen is entire. Dr. Davis (Loc. cit. p. 101,) observes that the greater part of the circle at the basis of the hymen when that structure remains, and at the same locality when it has suffered rupture, may occasionally be seen studded with caruncles of different origin; such extra caruncles in some cases being few and small, but in others large and numerous. He alludes to one case, which was that of a young lady of unquestionably good character, who, in consequence of some irregularities imputed to a gay husband, to whom she had been recently married, became the subject of a professional examination: there presented at the orifice of the vagina on either side, and in immediate contiguity to the caruncules remains of the hymen, two large multifoliated masses of structure, disposed in parallel layers in such a manner as scarcely to fail to suggest the idea of a pair of epaulettes. These are the forms under which the hymen is usually found; but it should be borne in mind by the medical jurist that it is liable to certain malformations, with which he should be acquainted. It is commonly a thin membrane, easily ruptured by any large body introduced into the vagina. But it sometimes occurs that it is possessed of so much firmness as to resist the intromission of the penis This unusual degree of thickness and strength may belong to a hymen composed of one uniform membrane; or to that conformation of it termed cribriform, from its being pierced by a number of holes. In this latter condition the membrane is commonly exceedingly strong, and capable of resisting the ordinary means of rupture. It is a state, however, that does not prevent impregnation, some cases of which are related by Dr. Davis; and as they relate to an important medico-legal point, we refer to them, in addition to those already mentioned in the article IMPOTENCE. One of these cases of cribriform hymen we transcribe in consequence of its great interest: "It was usually narrated in his peculiarly terse style by the late Dr. Haighton, in his lectures on midwifery in Guy's Hospital. The subject of it had been the lady of one of the physicians to that or to the neighbouring hospital of St. Thomas. It was become matter of post-mortem history even in the time of Dr. Haighton. The hymen was perforated by many small apertures; but it nevertheless was so strong that it had resisted all the efforts of the husband to effect its rupture. That gentleman, however, concealed his chagrin; nor did he take any means to accomplish artificially what he had failed to do by the ordinary means. Under these circumstances the lady drooped and became unhappy; but she also, at no distant period, became the subject of faintings and sickness, and eventually of great abdominal enlargement, and of anasarca of her lower extremities. During the urgency of those symptoms she was advised to go to Bath for the benefit of the waters and of the other good things to be obtained at that celebrated city. No remedy was found, however, even there for the lady's dropsy, and the symptoms became more and more urgent every day. Finding no relief at Bath, and giving up all hope of recovery any where, she determined, after a residence of some weeks at that place, to return

to London, in order that her remains might the more conveniently be deposited in the monumental vault of her family. Whilst on this journey, which she was performing in a post-chaise, she was seized with a severe abdominal pain, which she naturally enough ascribed to a spasm of the intestines. This colic, which was moderate and bearable at the commencement, became so extremely violent in its progress that she was obliged to stop suddenly at an inn on the road, where in less than an hour she was radically cured of her dropsy by becoming the mother of a well-grown living child. The hymen was then ruptured without the assistance of art." (Op. cit. p. 104.)

We have alluded to these cases to show that it is possible for all the moral guilt of a rape to be incurred without the conditions necessary to satisfy the law upon the point, namely, intromission of the penis, &c. Besides these sources of difficulty presented to the medical jurist in malformation of the hymen, there are some cases, and probably not a few, in which this membrane has never existed at all; or having been at first formed of great tenuity, has been ruptured and destroyed in early life. Accidental circumstances may also serve to obliterate it, such as disease, improper practices, or acrimonious discharges; and instances are not wanting where it has been destroyed by the pressure of the confined menstrual fluid. From the cases alluded to above, it appears that impregnation may take place without rupture of this membrane, but in these instances perforation is not supposed to have occurred. It is, however, stated by Zacchias that intromission may be effected when a disproportion exists between the organs, when the hymen does not exceed the ordinary size, but is thick and hard, and when connection has taken place during the presence of menstruation, or fluor albus, without damage to this membrane. Gavard (Foderé, Méd. Lég. t. iv. p. 340,) found it perfect in a female thirteen years of age, who was labouring under the venereal disease. Ruysch (Observ. Anat. Chirurg. xxii.) has said, that if coitus take place during or immediately after the menstrual excretion, this membrane is often not ruptured.

From these several circumstances of variety in the original formation and appearance of the hymen, its power of resisting the natural means of rupture in some cases, and its yielding in others to the slightest force, we are inclined to think that the accuracy necessary in forming a medico-legal opinion cannot be attained by looking to this sign alone. We must, however, agree with Dr. Beck (Elem. of Med. Jur. by Darwall, p. 52,) that it would be difficult to support an accusation of rape where the hymen is found entire, although its presence cannot be considered as an unequivocal proof of virginity; for, as we have stated, it has been asserted by good authority that it is not always ruptured in coitu. An instance is related by Dr. Smith (Prin. of For. Med. p. 410,) in which an accusation of rape fell to the ground in consequence of the presence of this membrane. This occurred in the case of a man named Stewart, who was tried at the Old Bailey in 1704 for ravishing two female children. The evidence being at variance as to the fact of penetration, the children were sent out of court to be examined, and the eldest was found to have the signs of virginity.

The state of the vagina is the next point worthy of consideration. In young subjects it is extremely small; but as the female advances towards puberty, it becomes increased in its dimensions. In a healthy adult virgin the parietes of the vagina are remarkably firm and substantial, and from the only function it has to perform, that of giving exit to the menstrual excretion, it is rigid and narrow. The internal surface is lined with a mucous membrane which is remarkable for the peculiarity of being much wrinkled or folded together into shallow irregularly transverse rugæ, the peculiar use of which is to qualify the passage for being indefinitely developed during parturition. These folds are removed by frequent sexual intercourse, and nearly obliterated in women who have borne one or two children. The dilatation of the vagina, and smoothness of its internal surface, are not, however, to be taken as unequivocal proofs of want of chastity, for these appearances may arise from other causes. There are disorders of which the tendency is to render it so, as fluor albus, chlorosis, or menorrhagia; and certain malpractices will also occasion the same dilatation as sexual intercourse; and, on the other hand, coitus may have taken place, and the vagina afterwards reassume its contracted condition.

Generally speaking, in virgins the external labia are thick, firm, elastic, and internally of a bright red colour, with their edges so opposed as to exclude the entrance into the vagina; while in married women, or those accustomed to coition, they are soft, pale, and have an interval of greater or less extent between them. But these signs will be found to vary according to the age, temperament, and state of health of the individual. Thus, in persons of a sanguine temperament, although in the habit of venereal enjoyment, the colour, firmness, and thickness of these parts will be preserved; and virgins of advanced age and weak leucophlegmatic habit of body, or those afflicted with leucorrhœa or menorrhagia, may present appearances which, if he above signs were supposed to be valid, would lead to a conclusion of an opposite character. The same observations will apply to the state of the frænum labiorum, or posterior commissure of the pudenda. Some authors have esteemed the integrity and rigidity of this part as a proof of virginity, but no positive conclusion can be drawn from it, for it frequently remains untouched even after parturition.

From the observations just made, we feel ourselves compelled to acknowledge that there are no anatomical signs by which we can attest the presence of virginity. Taken singly they are all fallacious, and even viewed in connection, they can only favour the conclusion as to the chastity of the female; but the converse is not established by the absence of these signs, as they may be all absent from causes already enumerated, although their absence may serve to corroborate the opposite opinion in suspected cases.

[M. Devergie (*Médecine Légale*, 2de édit. i. 345, Paris, 1840) has entered at length into an inquiry, founded on numerous examinations, as to the normal condition of the genital organs, in young children; in young girls near the period of puberty; in women who have had sexual intercourse; and in those who have had children;

and he lays great stress on the circumstance, that there is a considerable separation between the labia at their upper part in young children ;—the reverse occurring after puberty, and especially in those who have had sexual intercourse.]

Signs of Defloration.—In this inquiry it is necessary to take into account the age, strength, and state of mind of both persons concerned. The sexual organs of both should be examined, and this as speedily as possible after the alleged assault, for if the woman have reached the period of puberty, no satisfactory information can be obtained by a professional examination unless made immediately after the commission of the act. In children, from the great disproportion of the parts, the violence is greater, and the effects consequently remain for a longer time ; but in a subject of full organic development, the appearances consequent to connection are very fleeting. If the examination be made early, and particularly if the female have been a virgin, besides the state of mental excitement in which she may be found, there may be physical signs consisting in local marks of violence. The parts are found lacerated, tumefied, and bloody or inflamed, and painful to the touch; the hymen most commonly ruptured; and sometimes the presence of semen can be detected. Besides these marks upon the genitals, there are usually bruises or ecchymoses on other parts of the body, particularly on the arms, thighs, nates, and breast. In children the local appearances are more evident, from the greater injury the parts have received; and the inflammation is sometimes so great as to incapacitate them from walking. But in married women, even a very speedy examination will fail to afford much assistance, from the previously dilated condition of the parts. It should be borne in mind that the female genitals are liable to diseases which may imitate the appearances just pointed out. Of this fact, a case related by Dr. Percival (Medical Ethics, p. 103 and 231) is a striking example. A girl, four years of age, and in good health, was suddenly seized with inflammation of the pudenda, and symptoms of defloration, with pain in making water. She had slept two or three nights in the same bed with a boy fourteen years old, and had complained of being very much hurt by him during the night. The symptoms increased in violence, and the child died on the ninth day. An inquest was held on the body, and Mr. Ward, under whose care the patient had been in the Manchester Infirmary, deposed that death was caused by external injury. A verdict of murder was returned against the boy, and he was accordingly taken into custody. A very short time afterwards, however, several similar cases occurred in the same neighbourhood, in which there was no ground for supposing that violence had been offered. Fortunately for the boy, his trial had not come on, and Mr. Ward now informed the authorities of the mistake he had committed, and the prisoner was discharged. This kind of disease appears to be to a certain extent epidemic, and is very fatal. Thus, out of twelve cases mentioned by Mr. Kinder Wood, (Med. Chirur. Trans. v. vii. p. 84,) only two recovered. It is usually preceded by febrile symptoms for two or three days, and when the genitals are examined, they are found inflamed and swollen. The colour is dark, and ulceration with gangrene quickly follows The fever assumes a typhoid character, and death shortly takes place.

The presence of the venereal disease in the female, when its invasion corresponds with the period at which the outrage is stated to have occurred, that is, in from three to eight days afterwards, is a very strong corroborative proof of defloration, if the aggressor is found on examination to be afflicted with the same disease. This is not uncommonly the case in young children, in consequence of a very prevalent notion entertained by the lower orders, that connection with a virgin is a certain cure for the disorder. Appearances resembling gonorrhœa, however, should be looked at with a very scrupulous eye, as it is now perfectly well known that children, particularly those of strumous delicate constitutions, are liable to purulent discharges from the vagina, which very much resemble the consequences of impure connection. These discharges take place during dentition, or from the presence of worms in the intestinal canal, and are also sometimes observed in the male sex from the same causes. We are indebted to Sir Astley Cooper (Lectures on Surgery) for the following energetic observation on this peculiar affection. "There is a circumstance on which I am exceedingly anxious to dwell—I allude to a discharge from young females, and I hope that there is not one here this evening but will be strongly impressed with the importance of the subject. Children from one year old, and even under, up to puberty, are frequently the subjects of a purulent discharge from the pudendum, chiefly originating beneath the preputium clitoridis; the nymphæ, orifice of the vagina, and the meatus urinarius, are in an inflamed state, and pour out a discharge. The bed-linen and rest of the clothes are marked by it. It now and then happens to a nervous woman to be alarmed at such an appearance, and she suspects her child of having acted in an improper manner; and perhaps not quite clear herself, she is more ready to suspect others, and says, dear me, (if she confesses,) it is something like what I have had myself. She goes to a medical man, who may unfortunately not be aware of the complaint I am speaking of, and he says, 'your child has got a clap.' I can assure you a multitude of persons have been hanged for such a mistake. I will tell you exactly what takes place in such cases; the mother goes home and says to the child, 'who is it that has been playing with you? who has taken you on his knee lately?' The child innocently replies, 'no one, mother, nobody has, I declare to you.' The mother then says, 'Oh, don't tell me such stories; I will flog you if you do.' And thus the child is driven to confess what never happened, in order to save herself from being chastised ; at last she says, 'Such a one has taken me on his lap.' The person is questioned, and firmly denies it; but the child, owing to the mother's threats, persists in what she has said. The man is brought into a court of justice; a surgeon who is ignorant of the nature of the discharge I am now speaking about, gives his evidence; and the man suffers for that which

he never committed. The mother is persuaded, if there be a slight ulceration on the parts, that violence has been used, and a rape committed.

"If I were to tell you how often I have met with such cases, I should say that I have met with thirty in the course of my life. The last case I saw was in the city; a gentleman came to me, and asked me to see a child with him who had a gonorrhœa on her. I went, and found that she had a free discharge from the preputium clitoridis. I said that there was nothing so common as this. There was considerable inflammation, and it had even proceeded to ulceration, which I told him would soon give way to the use of the liquor calcis with calomel. 'Do you tell me so?' he replied; 'why, suspicion has fallen on one of the servants; but he will not confess. If he had appeared at the Old Bailey, I should have given my evidence against him; for I was not aware of what you have just told me.' I told him that if the man had been hanged by his evidence, he would have deserved to be hanged too. I am anxious that this complaint should be known by every one present, and that the remarks which I have made should be circulated throughout the kingdom. When a child has this discharge, there is a heat of the parts, slight inflammation; and this sometimes increases, and goes on to ulceration. This disease sometimes occurs in children at the time of cutting their teeth."

In the year 1831 a man was arrested in the city of Dublin on a charge of a rape committed on a child; the only evidence of which was the presence of a purulent discharge from the pudendum. Popular opinion, as is usual in such cases, ran high against him; and it was only through the positive opinion of an intelligent surgeon that the case was explained, and the man liberated. A case of a somewhat similar nature lately came under the observation of the writer. A lady and gentleman came to his house one evening in a state of great alarm and excitement, accompanied by their child, a girl of four years old, whom they stated to be afflicted with a terrible disorder, communicated to her by some person in their employment. They had previously shown the child to an apothecary, who confirmed their worst apprehensions, and at once declared that the girl had got a clap. On examination, the parts were found in a state resembling that just described, with a free purulent discharge; and it was with no small degree of pleasure the writer was able to console the parents by assuring them that their child was labouring under no uncommon affection, and that a few days would set all to rights. It has rarely fallen to his lot to witness a more sudden transition from grief to joy than this announcement effected.

Dr. Ryan (Med. Jur. p. 185,) mentions the case of a delicate girl, aged 11 years, who had a purulent discharge from the external genitals, and accused a young man of eighteen, whose genitals were developed in an extraordinary degree, of having violated her person. Two apothecaries swore the girl had been violated, a rape committed, and gonorrhœa communicated. Dr. Gordon Smith, Mr. Whitmore, and Dr. Ryan were of a different opinion. The case was grievously mismanaged for the prisoner; the only evidence produced in his favour was Dr. Smith's, which was contrasted with that of the two medical witnesses for the prosecution, who had refused to examine the person of the prisoner, although assured that he had no discharge from the urethra, and had not had any for six months previously. The man was found guilty at the Middlesex sessions, and sentenced to six months' imprisonment, and lectured by the chairman on his good fortune that he was not hanged. The mother of the child confessed to Dr. Smith that she had had the discharge since she was five years old.

[In a recent article (*Lond. and Edinb. Monthly Journal of Med. Science*, Sept. 1844, p. 760,) Dr. J. R. Cormack has described similar cases which lead him to the practical conclusion, "that a variety of causes, constitutional and local, may (either singly or in conjunction with one another) give rise to discharges, which cannot be distinguished from those occasioned by impure coitus, to which the name of gonorrhœa is commonly applied."]

From these and other similar instances, we cannot too strongly urge the necessity of an early examination of both parties. By following this course, it has happened that the man has been acquitted where marks of disease were discovered in the female, because no signs of gonorrhœa have been detected about himself. A case related by Sir Matthew Hale (*Paris and Fonblanque*, Med. Jur. vol. i. p. 418,) furnishes an instance where an innocent man might have been saved from a malicious prosecution, to the hazard of his life, by this precaution. Foderé (Méd. Lég. vol. iv. p. 363,) mentions two cases from Zacchias, where the falsehood of an accusation was determined by a comparative inspection of both parties. Besides the presence or not of disease, there are other points to be determined by examination. Thus it may happen that the man is impotent; the penis may have been lost by sloughing, accident, design, or cancer; the female organs may be so constructed as to prevent the possibility of penetration; in all of which cases an inspection of both parties can alone give grounds for conclusive opinions. It has been remarked by a writer in a celebrated periodical work, with reference to the purulent discharge of what we have just spoken, that "we must take care not to run into the opposite error of ascribing inflammation, ulceration, and discharge in cases where violence has been alleged, to this disease without sufficient grounds; for it is extremely improbable that diseases which occur so rarely should happen to appear in a child to whom violence was offered, unless that violence had some effect in producing it." (Edin. Med. Surg. Journ. vol. xiii. p. 491.) On this point we think it right to observe that the laceration, tumefaction, and inflammation consequent to the violation of a child are very different from the disease under consideration, and could scarcely be confounded with it. Its great resemblance is to true gonorrhœa; and that point can be settled by a personal examination of the man accused. Dr. Dewees (Treat. of Children, pp. 236, 435,) states that when this disease arises in very young subjects, it almost always proceeds from a neglect of cleanly attention to these parts, either by withholding a frequent use of lukewarm water, or permitting the child to remain too long wet. Children, however, of a more advanced age

have also discharges of a purulent character, that seem to arise from a morbid action of the mucous membrane of the vagina. This frequently shows itself about the fifth year, and may continue, if neglected, to almost any period. It should be recollected that violence has been sometimes inflicted on the external genitals for the purpose of sustaining an accusation against an innocent person. A remarkable case of this sort is related by Foderé. A female at Martigues, in 1808, accused eight or ten of the principal persons of the place of having violated her grand-daughter, aged about nine years and a half, at an inn. She laid her complaint before the judge de paix, and stated that she would withdraw it provided the accused would accommodate the matter with her. She had procured a daughter of the inn-keeper, aged sixteen and an idiot, as a witness. As the charge was obstinately persisted in, Foderé, with two officers of health, was ordered to examine the child in presence of the judge; and suspicion was immediately excited from the delay used in admitting the visitors. On examining the parts, he found the hymen untouched, and the vagina extremely narrow. Around the pudenda, however, a red circle about the size of a crown was observed, which appeared to have been induced recently; and this was indeed the fact; for at the end of half an hour the circle had decreased in size, and the redness disappeared. Had this been the effect of great violence, it is natural to suppose that it would have increased in intensity of colour. A report was prepared, stating the above facts; and the consequence was, that the accuser was put in prison, and finally ordered out of the city.

The chief point in an accusation of rape, necessary to be proved, is the act of coition; but as considerable difference of opinion has existed as to what legally constitutes this act, it is necessary to make some observations upon it. Some authorities have maintained that simple penetration was sufficient, while others have judged that without emission the crime is not complete. In the case of Russen, the schoolmaster, who was tried for a rape committed on a girl under ten years of age, it was proved by two surgeons on behalf of the prisoner, and corroborated by four others who had examined the girl, that the hymen (which they considered an indubitable mark of virginity) was whole and unbroken, and that the passage was so narrow that a finger could not be introduced. But Mr. Justice Ashurst, who tried the case, left it to the jury whether any penetration were proved; for if there were any, however small, the rape was complete in law. The jury found him guilty, and he received judgment of death. But before the time of execution, the matter being much discussed, the learned judge reported the case to the other judges for their opinion, whether his directions were proper; and upon a conference it was unanimously decreed that the directions of the judge were perfectly right. They held that, in such cases, the least degree of penetration was sufficient, though it may not be attended with the deprivation of the signs of virginity. It was, therefore, properly left to the jury by the judge; and accordingly, the prisoner was executed. This occurred in the year 1777. On the other hand, Lord Coke, Sir Matthew Hale, and Hawkins held that there must be both penetratio and emissio seminis, and this appears to have been the decision of Skynner, C. B. Gould, Willis, Ashhurst, Nares, Eyre, and Hotham, against Lord Loughborough, Buller, and Heath; Lord Mansfield, though present, having given no opinion of his own. The argument is stated to have turned on the words carnal knowledge, to which the majority contended that emissio seminis was absolutely necessary. (*Paris and Fonblanque*, Med. Jur. vol. i. p. 433.) This state of the law rendered cases of rape extremely difficult to prove; for in virgins it is not at all likely they would be conscious of any such circumstance having taken place, particularly when we consider the state of fright, pain, and weakness into which they are necessarily thrown; and even in married women it does not appear that they are always conscious of emission—indeed, we should be inclined to suppose the reverse. Judge Buller stated, in giving judgment on a case in 1787, that he recollected a case where a man had been indicted for a rape, and the woman had sworn that she did not perceive anything come from him; but she had had many children, and was never in her life sensible of emission from a man. Again, in the case of children, it is manifestly impossible that evidence of emission can be obtained; and, as has been well remarked by Dr. Paris, if it be true that certain eunuchs have the power of erection, and consequently of penetration, they may morally ravish without incurring the punishment of rape; for it is certain that they can have no emissio seminis; or a man may have perpetrated all the more atrocious parts of his crime, and yet being interrupted in the least voluntary constituent of it, escape the well-merited vengeance of the law; while it is evident, on the other hand, that the innocent victim has suffered in body, mind, and reputation, as much as if the crime had been legally completed. (Loc. cit.) It has been stated in defence of this practice of requiring proof of emission, that it is quite necessary to make the proof of the crime difficult in order to avoid false accusations, for it often happens that the only chance an innocent man has is the cross-examination of the prosecutrix; if, therefore, it be necessary to prove all the circumstances, including emission, it follows that there is a greater likelihood of the witness tripping in her evidence.

The question with respect to requiring proof of seminal emission in cases of rape has been recently settled by an act (9 Geo. IV. c. 31, passed June, 1828,) which cites "that upon trials for the crimes of buggery and of rape, and of carnally abusing girls under the respective ages hereinbefore mentioned, offenders frequently escape by reason of the difficulty of the proof which has been required of the completion of these different crimes; for remedy thereof be it enacted, that it shall not be necessary in any of these cases to prove the actual emission of seed in order to constitute a carnal knowledge, but that the carnal knowledge shall be deemed complete upon proof of penetration only." By the same act the crime of rape, or of the abuse and carnal knowledge of a girl under ten years of age, is punishable by death. Abuse and carnal knowledge of a girl

between ten and twelve years of age is considered a misdemeanour only, punishable by imprisonment, with or without hard labour.

In Philadelphia, where the law is the same as with us, it has become common of late years to indict for an attempt to commit a rape, rather than for the crime itself, and chiefly from the difficulty of proof. Emission, however, is not considered essential in Pennsylvania (according to Judge Cooper); and properly, he adds, for it is not the essence of the crime, and it may happen without being perceived in cases of violence. In Illinois it is expressly enacted that so much of the law regulating the evidence in case of rape as makes emission necessary, is hereby repealed. (*Beck*, p. 67.)

[In the United States, the disposition, almost universally, is, to consider penetration alone to be sufficient evidence as to the *carnaliter cognovit;* and recent English decisions are to the effect, that the least possible introduction of the male organ within the orifice of the vagina,—even short of the rupture of the hymen, and without the emission of sperm,—constitutes a rape, provided it be done forcibly, and against the will of the female. (See 5 *Carrington & Payne's Reports*, 321; and *Ibid.* August 27, 1838; Regina *v.* Hughes, 1841, in *Ibid.* 9: cited in Guy's *Principles of Forensic Medicine*, p. 52, Lond. 1843.)

Of late years, great stress has been laid upon spots or stains on the linen of the accused, or of the woman; which, according to M. Devergie, (*op. cit.* i. 358,) afford, at times, the strongest proofs of violation. These spots are of two kinds, and occupy two different positions—the one on the anterior part of the chemise, and the other on the posterior. This, at least, is their most common situation. The spots on the front of the chemise present all the characters of sperm. They are of a greyish-white colour; circumscribed, roundish, and terminated at their circumference by a greyish line of a deeper colour. The linen is stiffened; and, if the effort to violate has been recent, the spots, even when dry, may exhale a spermatic odour; and, when subjected to analysis and microscopic examination, may furnish all the characters of sperm. The spots on the hind part of the chemise are most commonly formed of blood; but they usually occur under two different forms: the one, of a deep red, smaller, rich in colouring matter, and of an equal degree of colour over their whole surface; the other, of a much brighter red, or rather of a reddish yellow: larger than the first; paler at the centre, and bounded at the circumference by a circle of red colouring matter, deeper than the rest of the spot. The former are produced by pure blood extravasated at the time of the sexual union; the latter by a bloody serum, a sero-sanguineous oozing, less and less coloured, and altogether like that which flows from wounds made by a cutting instrument, when they cease to discharge blood. This respective position of the spots, M. Devergie adds, is not so constant but that spots of blood, or of sanguineous serum, may exist on the front of the chemise, and some drops of sperm on the back: but still they are more frequently seen under the circumstances described above.

Mr. Taylor (*Manual of Medical Jurisprudence*, p. 579, London, 1844) affirms, that cases of rape have hitherto been tried without reference to this species of evidence; and that it is not easy to perceive how this can be necessary to the proof of the crime, when the present law of England demands only proof of penetration, and not of emission. "Thus"—he says—"a rape may be legally completed without reference to emission; and, medically speaking, it appears quite possible that there might be emission without any penetration. Admitting that certain stains of this description are found on the clothes of an accused party, is this to be taken as an undeniable proof of the legal completion of rape? It appears to me that it cannot be so taken, and, therefore, that the affirmative evidence from the miscroscope is as liable to lead to error as that which is purely negative. Besides, if such evidence were either required or received, it is impossible to set a limit to the mistakes and fallacies into which a court of law might be led. It could only escape from these by receiving evidence from a practised microscopical observer. Among the reports of numerous trials for rape, in our courts, I have never yet met with a single instance in which such evidence was required, or would have been of the least utility." (P. 580.)

Great caution would, doubtless, have to be used in admitting such testimony: yet it is easy to see, that the fact of blood upon the clothes might be *primâ facie* evidence of violence, and the presence of sperm strongly indicate the object of such violence.

It need scarcely be said, that care must be had not to confound spots of blood with the stains produced by the menstrual discharge. Menstrual blood contains but little fibrin, and does not coagulate. It is probably, also, darker than that which would flow as the result of violence. By introducing a plug into the vagina, it could be discovered that the blood proceeds from high up that canal; which would at once show that it was not the result of violence, if any doubt previously existed. In case of suspected spots of sperm, by infusing the linen in water, and placing the fluid in the field of a microscope, if spermatozoa be perceptible, there will be no difficulty in arriving at a decision. Dr. Dewy (*Edin. Med. and Surg. Journ.* iv. 15) affirms that he observed them in a seminal stain which had been kept eighteen days; and still more extraordinary cases are on record. (Devergie, *op. cit.* iii. 347, and Guy, *op. cit.* p. 61.)]

This crime may be committed on a female at any period of life after she has passed mere infancy. We have already mentioned the law as applied to children. In this case the charge of violation requires the most accurate inquiry, because the material evidence in other cases, that of the sufferer herself, is wanting, from her being incapable as a witness in consequence of her youth. "If the rape be charged to have been committed on an infant under twelve years of age, she may still be a competent witness, if she hath sense and understanding to know the nature and obligation of an oath, or even to be sensible of the wickedness of telling a deliberate lie; nay, though she hath not, it is thought by Sir M. Hale, that she ought to be heard without oath, to give the court information; and others have held that what the child

told her mother or other relations may be given in evidence, since the nature of the case admits frequently of no other proof. But it is now settled by a solemn determination of the twelve judges, that no hearsay evidence can be given of the declarations of a child who hath not capacity to be sworn; nor can such child be examined in court without oath; and there can be no determinate age at which the oath of a child ought either to be admitted or rejected; but their admissibility depends upon the sense and reason they entertain of the danger and impiety of falsehood, which is to be collected from their answers to questions propounded to them by the court." (*Paris and Fonblanque*, vol. i. p. 421.) Females, before they reach the time of life at which menstruation commences, are generally ignorant of the consequences likely to result; and this, coupled with want of physical power, may often tend to facilitate the commission of rape. But at the age of puberty it has been doubted whether a woman of ordinary strength may not successfully resist the attempts of a single man.

Farr, in speaking of this subject, expresses himself in the following terms:—"But the consummation of a rape, by which is meant a complete, full, and entire coition, which is made without any consent or permission of the woman, seems to be impossible, unless some very extraordinary circumstances occur. For a woman always possesses sufficient power by drawing back her limbs, and by the force of her hands to prevent the insertion of the penis, whilst she can keep her resolution entire." (P. 41.) Dr. Beck quotes the following answer given by the medical faculty of Leipsic to the question whether a single man could ravish a woman: "Si circumstantias quæ in actu coëundi concurrunt consideramus, non credibile, nec possibile, videtur, quod unus masculus nubilem virginem (excipe impubem, teneram, delicatam, aut simul ebriam puellam) absque ipsius consensu, permissione atque voluntate vitiare, aut violento modo stuprare possit; dum feminæ cuilibet facilius est si velit, penis immissionem recusare, vel multis aliis modis impedire, quàm viro eidem invitæ planè intrudere." (Valentini Pandectæ, vol. i. p. 61.) It is necessary, therefore, to be extremely cautious in admitting the truth of accusations, unless the bodily power of the man far exceeds that of the complainant. At the same time, however, we should not entirely agree with the positive opinions just quoted, for we think it possible that by long-continued violence, intimidation, or other circumstances, the man may ultimately prevail.

The question naturally arises here, *can a female be violated without her knowledge?* in which case the crime would be equally great, for it would be still without her consent. There are different ways in which we may suppose this to be effected, as during natural sleep, or stupefaction caused by inebriation or narcotics, or during a fit. As to the possibility of rape being committed on a virgin during natural sleep, we are very much inclined to doubt it, notwithstanding the decision of the faculty of Leipsic, "Dormientem in sella virginem insciam defiorari posse." (Valentius, Novellæ Med. Leg. cas. 1.) When we consider the violence inflicted, and the pain that attends a first intercourse, we think it scarcely possible that any natural sleep could be so sound as to preserve the woman unconscious of what was going forward. The case is not exactly the same with married women, in whom from previous sexual intercourse the parts are more dilated. In such case we must admit the possibility, but not at all the probability, for even in them natural sleep, however heavy, would be most likely broken by the attempt at violation. That a female, whether virgin or not, may be ravished during the insensibility attending intoxication, the administration of narcotics, or disease, will be readily granted. As the sufferer can give no direct testimony as to the fact, the only corroboration to be obtained is from a personal examination; but as we have already mentioned, this can be of no use alone in the case of her being a virgin. There is reason to think that narcotics have not been unfrequently administered for the purpose of facilitating the commission of rape, which circumstance is justly considered a great aggravation of the offence, and, when proved, is sure to draw down the heaviest punishment on the perpetrator. A case occurred in Dublin, in April 1831, in which a gentleman was tried for a rape, and convicted, chiefly in consequence of an impression made on the minds of the jury, that some soporific had been administered by him to the young lady, by means of which he was enabled to effect his purpose. (Dublin Morning Post, April 20, 1831.) There is another mode in which this crime may be committed, wherein, although the woman is not unconscious, she makes no resistance, neither does she consent: that is, when a man obtains admission to the bedroom of a married woman, and imposes himself on her as her husband. This constitutes a case of rape, and subjects the offender to the usual penalty. The same holds good in the case of forcible abduction, where a woman is compelled to marry and is afterwards violated by force.

[Dr. Guy (*op. cit.* p. 64,) states, that in the year 1840, he was consulted by a poor woman, who, after mentioning other complaints of little importance, stated, that she was somewhat alarmed by the fact of her sleep being so heavy, that she was with difficulty aroused. She added, by way of illustration, that her husband had assured her that he had frequently had connection with her during sleep.]

The fact of sexual intercourse being proved or admitted, it now remains to be ascertained whether the woman consented or not. If she be dead, which sometimes happens from the violence employed, the most material part of the evidence, her own testimony, is of course wanting, unless she have lived long enough to give information before her death. In the well-known case of Abraham Thornton, who was tried some years ago, in England, for the murder of Mary Ashford, (a case remarkable for being the last in which a wager of battle was offered, such right having been immediately afterwards abolished by the statute 59 Geo. III. c. 46;) the prisoner admitted having had carnal knowledge of her, but stated that it was with her own consent; and although the general tenor of the evidence was in opposition to this assertion, the death of the unfortunate woman rendered it impossible to ascertain the truth. It was formerly

imagined that the occurrence of pregnancy after violation was evidence of the consent of the woman. This opinion was maintained by Dr. Bartley (P. 43,) and Dr. Farr (P. 43,) on the supposition that women under the influence of the depressing passions, such as fear, terror, &c. could not conceive. It is said by Mr. Dalton, that if a woman at the time of the supposed rape do conceive with child by the ravisher, this is no rape, for (he says) a woman cannot conceive unless she doth consent. Such an opinion was founded on the idea that a certain amount of enjoyment on the part of the female is necessary towards conception. But it has been clearly ascertained that this is not the case, and the process of impregnation may go forward, totally without the will, consent, or enjoyment of the female. "That so absurd a notion as that conception evidenced consent, should in modern times have obtained amongst any whose education and intellect were superior to those of an old nurse, is indeed surprising: at this day, however, facts and theory concur to prove that the assentation of nature in this respect is no ways connected with violation of mind." (Burn's Just. tit. Rape.) Such is the opinion of all medical jurists; and it is supported by the many facts on record, of impregnation having taken place in consequence of connection had with females during insensibility from disease or the influence of narcotics.

It was ruled, in the case of the king against Fleming and Windham (Leach's C. L. p. 996, and Paris and Fonblanque, vol. i. p. 439), A. D. 1779, that if the party be dead, the deposition of the girl, taken before the committing magistrate and signed by him, may after her death be read in evidence at the trial of the prisoner, although it was not signed by her, and she was under twelve years of age; provided she was sworn and appeared competent to take an oath; and all the facts necessary to complete the crime may be collected from the testimony so given in evidence. But, as is the practice in other criminal cases, it is not necessary that the female should be sworn, if her testimony is given while she is dying, she being conscious of her state at the time; for it is considered that the awful situation in which she is placed is as sure a guarantee of the truth as any form of oath could be. At the same time it is quite necessary to have proof of the soundness of her understanding at the time, for without this the solemnity of the occasion, and the anticipation of death, may not have a sufficient impression on her mind.

T. E. Beatty.

END OF THE THIRD VOLUME

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